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ABSTRACT

This volume summarizes projects funded by the Fund for the Improvement of Postsecondary Education, examining the various lessons learned. The 39 reports are organized in nine sections titled: (1) "Preface"; (2) "Access and Retention"; (3) Improving Teaching and Learning"; (4) "Curriculum and Instruction"; (5) "General Education"; (6) "International Education"; (7) "Teacher Education"; (8) "Performance Funding and Reporting in Colleges and Universities"; and (9) "Disseminating Proven Reforms." Each project report describes its purpose, innovative features, evaluation and project impact, lessons learned, project continuation and dissemination, and contacts for further information. Overall, most projects were deemed successful. Lessons gleaned from the projects include the fact that holding students to high standards works; passionate, creative teaching is crucial; difficulties will arise and can be surmounted; and excellent work eventually brings recognition and reward. (SM)

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LESSONS LEARNED
FROM
FIPSE PROJECTS IV

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Fund for the Improvement of Postsecondary Education
U.S. Department of Education

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Lessons Learned from FIPSE Projects IV

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1. Macalester College and Mounds View Public Schools: A Computer-based, Articulated Geography Curriculum K-14 3

GeoLinks evolved out of a need for an outcomes-based, K-14 curriculum in geography that could be offered via electronic technology. Its creation coincided with three major developments in geographic education: the National Geography Standards, the Minnesota High School Graduation Standards, and new entrance requirements for the Minnesota State System of Colleges and Universities. The curriculum conforms to national and state geography standards, and was embraced by classroom teachers because it allows them greater flexibility in designing classwork that matches the standards.

2. Mary Baldwin College: Development of a Series of Liberal Arts Courses to Strengthen College Performance of High School GED Students 9

Believing that academic rather than motivational factors needed to be addressed to help GED holders in a women's prison to succeed, project staff created three courses that concentrated on specific academic skills and content, and demanded more reading and writing than many college courses. In developing the courses, it was assumed that students would have no experience in critical reading of and writing about book-length texts, little knowledge of world literature and history, algebra, geometry, and probability, little preparation for testing other than multiple choice, and no experience with classroom discussion or interdisciplinary thinking.

3. Western Washington University: Law and Diversity Program 17

The Law and Diversity Program recruits minority and non-traditional students who have either not considered entering the legal profession or who need to improve their skills in order to gain admission to law school. The program provides an academically demanding environment where the students' perspectives are valued and their needs for various kinds of support are met.

4. **Western Interstate Commission for Higher Education (WICHE): Balancing Quality and Access** 25

To enable students to take full advantage of the flood of advances in distance education, this project sought to address the barriers imposed by interstate policies, and especially the need for standards with which to judge the quality of distance education programs.

5. **California State University, Fresno: Assessment of Academic Literacy Skills– Preparing Minority and Limited English Proficient Students for Postsecondary Education** 31

The language of lectures and textbooks is radically different from that spoken on a daily basis by most students and their families, and this difference is often at the root of serious academic difficulties. The goal of this project was to develop an assessment of students' academic language proficiency and a curriculum to improve their academic language skills.

III. IMPROVING TEACHING AND LEARNING 39

6. **American Association for Higher Education: Forum on Faculty Roles and Rewards** 41

The forum created a national conversation around fresh formulations of such problems as the definition of scholarship, the integration of teaching, research and service, and the impending wave of faculty retirements nationwide.

7. **Cold Spring Harbor Laboratory: A Training Program for Small College Faculty in DNA Manipulation and Human Genetics** 47

The projected need for professionals with a general knowledge of DNA science and the increasing number of students who study molecular genetics in high school are pressing for the introduction of this topic in basic college biology courses. This project offered faculty hands-on experience in molecular genetics through a series of laboratories designed for large numbers of learners.

8. Seton Hall University: Assessing the Teaching and Learning Outcomes of the Katz/Henry Faculty Development Model 53

According to prior evaluations of Katz/Henry programs, faculty felt that they had made significant improvements in their teaching, but these self-reports could not be verified. Higher education's increasing concern with quality of instruction and its concomitant requirements for faculty development, combined with decreasing financial resources at most institutions, prompted this project to determine whether there was in fact a link between this approach to faculty development and student learning.

9. Southwest Texas State University: Interactive Video Listening Comprehension in Foreign Language Instruction 59

Many foreign language faculty lack both the expertise to write computer programs and the time in which to learn how to do so. Authoring systems, by eliminating the need to program the computer, allow faculty to develop multimedia lessons which focus on listening comprehension and match their—and their students'—specific requirements.

10. Tufts University: Detailed Evaluation of a Novel Approach to Curricular Software 65

From 1987 to 1990, with FIPSE funding, the Curricular Software Studio at Tufts developed ConStatS, a software package to help introductory statistics students to assume an active, experimental style of learning. Although, during the original project, formative evaluation showed that students felt comfortable using ConStatS, its creators wanted to find out whether the software made a difference in learning, how students used it, and which portions of it worked with what type of students. They also wanted to provide an example of good software evaluation, a model that would focus on comprehension and retention rather than on student attitudes and speed of learning.

11. West Virginia University: Development of a Computer System to Evaluate and Interpret Published Drug Studies 71

Faced with the need to equip students to analyze drug literature, project faculty reasoned that it made sense to use computer assisted instruction (CAI), because the computer allows for numerous examples and levels of explanation that students can access and review as needed. Faculty also believed that CAI would promote active learning in a curriculum that students had hitherto mastered mostly by listening to lectures and memorizing facts.

IV. CURRICULUM AND INSTRUCTION 77

12. Columbia University College of Physicians and Surgeons: Electronic Basic Medical Science Core Curriculum 79

This project developed a new strategy for teaching the basic sciences that deliberately reduces the volume of core material and engages students in learning through electronic means. The project's creators restructured the basic medical science curriculum into two levels of knowledge. Level 1 comprises a manageable core of basic materials for learning fundamental principles, while Level 2 contains a menu of advanced readings for critical analysis.

13. Clemson University: Cooperative Chemistry Laboratories 83

The introductory laboratory sequence was redesigned into a research-oriented program where groups of students work on projects to learn, in addition to laboratory techniques, problem solving, collaboration, and written and oral communication.

14. Clemson University: Revitalization of Nonstandard Calculus 87

Instead of focusing on the simple mastery of algebraic technique, this new approach to teaching business calculus seeks to impart conceptual understanding and the ability to interpret the mathematics in real-life situations.

15. Diablo Valley College: A Team-Taught Interdisciplinary Approach to Physics and Calculus Education 93

The project sprang from the collaboration of a mathematician and a physicist who noted excessive failure rates among students in the engineering calculus and physics sequences. The project's creators wanted not only to raise the success rates without decreasing content or expectations but also to increase the number of students, especially underrepresented minorities and women, who transfer to four-year institutions and complete their degrees in science and engineering.

16. University of Medicine and Dentistry of New Jersey, New Jersey Dental School: Curricular Revision for Community-Oriented Dental Education (CODE) 101

CODE aims to train dentists who can respond to the needs of the community as well as to those of individual patients. It seeks to produce practitioners who are technically competent in all aspects of general dentistry and to do so in a more time- and cost-efficient manner than the traditional curriculum.

17. **Sinte Gleska University: Training in Culturally Appropriate Interventions for Native Americans 107**

General ignorance about Indian culture, the reluctance of non-Indian providers to live in the isolated regions where most reservations are found, and the scarcity of Native American human services professionals have long made effective delivery of these services to Native Americans a rarity. The human services faculty at Sinte Gleska University developed a curriculum to train their students to provide much-needed high quality, culturally sensitive human services to Indian communities.

18. **Tufts University: Developing and Evaluating a Curriculum for Exploratory Learning in Ancient Greek Culture (Perseus) 113**

Perseus, a digital library on Greek culture created in 1993 at Tufts, spans the years 800 to 300 BCE, and includes not only Greek texts but English translations, works of art, archaeological artifacts, maps, site plans, and other related materials. This project studied the impact of a second, more refined version of Perseus in six institutions as well as within the wider community of users, and produced a set of classroom-tested curricular materials.

19. **University of Virginia: Core Knowledge Foundation 119**

The Core Knowledge Foundation, Trinity University (San Antonio, Texas), Hawthorne Elementary School (also in San Antonio), and five other elementary schools formed the Alliance for Content-Based Materials and Pedagogy. The alliance focused on the implementation of a content-rich core curriculum, the collaborative development of lessons to support it, the formation of a cadre of teachers-as-teacher trainers, and the national dissemination of its materials and results.

20. **The City University of New York: Preparing Doctoral Students for Careers in Urban Colleges and Universities 127**

The majority of existing faculty preparation programs focus exclusively on the teaching component of academic careers, and are oriented toward the needs and characteristics of a generic undergraduate population. By contrast, the purpose of this project was not only to prepare graduate students to teach but to teach urban undergraduates. The project aimed to provide instruction tailored to teaching in specific disciplines and to give graduate students a sense not only of what teaching would be like but of what it would be like to compete for a faculty position, for research dollars and for tenure and promotion.

21. Cleveland State University: Technology-Enhanced Accent Modification for International Teaching Assistants 133

Because the more ways the learner can sense a feature, the more easily he or she will learn and use it, this project developed multisensory computer instruction and feedback so that international teaching assistants can see as well as hear their speech. Learners are also able to retrieve, display, and play model utterances of speech features.

V. GENERAL EDUCATION 139

22. California State University, Los Angeles: Learning English for Academic Purposes 141

A partnership between faculty and supplemental instruction staff to teach academic language skills and improve performance of high-risk language-minority students in general education courses, this project integrates instruction in content and in academic literacy. The project addresses the needs of international students who have studied English in their countries, recent immigrants who have been exposed to English as a Second Language (ESL) instruction in high school, and English-dominant bilingual students with poor academic literacy.

23. College of William and Mary: Freshman/Sophomore Advising and Curricular Coherence 147

This advising system was created to meet the need for greater intellectual coherence in undergraduates' academic programs. Its design draws on the experience of successful advising models elsewhere and on findings of the state-mandated student-outcome assessment project.

VI. INTERNATIONAL EDUCATION 153

24. University of Connecticut: EuroTech—An International Program in Engineering 155

The demand for professionals with cross-cultural and foreign language abilities as well as overseas work experience is urgent and concrete. EuroTech was formed to answer this need by providing practical study in German, linked with academic training in engineering and industrial experience.

25. University of Maryland: International Negotiation Seminars 163

This cross-disciplinary course combines lectures with small-group seminars and emphasizes collaborative decision-making, cross-cultural experience, and introduction to technology via synchronous and asynchronous electronic communication with students in other universities in Europe and the United States.

26. University of Michigan: The Michigan Business Assistance Corps 169

The Michigan Business Assistance Corps was created to assist emerging democracies in Eastern Europe to move toward privatization and to provide masters of business administration students with an international experience. The corps arranged summer internships for the students, who served as consultants to private and public enterprises in Poland and Russia.

27. San Diego State University: The MEXUS Program 175

MEXUS is a binational undergraduate international business curriculum which integrates business, foreign languages, and regional and cultural studies. Through a consortial arrangement with universities on both sides of the border, it allows Mexican and U.S. students to satisfy degree requirements for the B.A. in international business as well as the *licenciatura en negocios internacionales* simultaneously. Students from both countries live and study in Mexico and in the United States a minimum of two years each and complete an internship at the end of the second year in the host country.

28. Wright State University: Project Chile.. 181

Based on intensive preparation leading to an international internship, Project Chile was intended to give students technical import/export skills, fluency in Spanish, an acquaintance with Chilean culture, and professional work experience.

VII. TEACHER EDUCATION 185

29. University of California, Riverside: Learning at Many Levels—Teacher Preparation at Professional Development Schools 187

This project sought to create professional development schools to prepare future teachers in the most realistic context possible and to integrate the subject-matter, pedagogical, and experiential aspects of their training. The project's creators also wanted to provide professional development opportunities for experienced teachers, and to encourage research related to educational practice on the part of teachers and university faculty.

30. Prescott College: Center for Indian Bilingual Teacher Education 195

The center serves adult Indians, living on rural Indian nations, who have already accumulated some community college credits. It offers a B.A. degree with Arizona state credentials in secondary, elementary, or special education, and endorsements in ESL and in bilingual education.

31. Vanderbilt University: Improving Undergraduate Teacher Education with Technology and Case-based Instruction 201

Faculty developed, tested and disseminated 16 videodisc-based cases enhanced by Hypercard and microcomputer technology, to be used in developmental and reading methods courses. They adapted the case-based procedures used in medicine, law and business, which have been found useful for problem-solving and preparing students to know and act simultaneously. The resulting videodiscs portray several units of instruction and present teacher and student interviews, numerous classroom scenes, procedural activities, and learning in various grouping arrangements.

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The state of Missouri redesigned its academic funding policies to emphasize results in specific areas with quantifiable goals. Based on previous planning priorities, Funding for Results recognizes institutions for their achievement of quality goals and for their design and implementation of faculty-driven teaching and learning improvement projects.

33. Prairie View A&M University: Developing Effective Performance Indicators for Different Learning Environments 221

The purpose of this project was to develop and disseminate a model for the regular and public assessment of the degree to which a university and its agencies are achieving the state's goals and fulfilling priorities. The project also formulated a list of valid, explicit, quantifiable performance indicators suitable for the longitudinal analysis of achievement and productivity.

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34. Anne Arundel Community College Cluster: Supplemental Instruction with Mentoring Support 239

Four community colleges adapted a supplemental instruction model which combines peer-led study groups, faculty mentoring, and faculty development. Participating students outperformed nonparticipants at all project institutions.

35. The City College of New York PASS Cluster: A Summer Bridge Program for Underprepared Students in Science.................................. 243

PASS consists of a preparatory science course with a special counseling component. This combination addresses underprepared students' lack of problem-solving skills and their failure to become integrated into the academic and social life of the college. The adapting institutions modified the City College model to fit local circumstances. Some stayed with the summer program; some integrated similar efforts into academic-year programs; and some combined summer and academic-year activities. However, all retained the combined problem-solving and counseling focus.

36. Dickinson College Cluster: Workshop Physics 247

Physics departments at six diverse institutions strove to adapt, with varying degrees of success, Dickinson's well-known action-based approach to introductory physics.

37. University of Missouri School of Law Cluster: Integrating Dispute Resolution Into Law School Courses 253

To counteract the dissatisfaction with the expense, delay, emotional trauma and other inadequacies of traditional litigation, the mentor institution helped six universities to integrate dispute resolution into their law school courses. To achieve this, substantial reservations on the part of the faculty had to be overcome.

38. Moravian College Cluster: Integration of Precalculus Topics into the First Course in Calculus 259

This project replaced the traditional precalculus-calculus sequence with one in which precalculus concepts are introduced as they are needed to understand calculus topics. Faculty readily adopted this approach, which, although it required them to reorganize their courses, did not demand a change in teaching style.

39. Stanford University Cluster: Building an Extended Community of Service Learners 263

Because service learning is not a single structure and set of procedures but rather a commitment to certain principles and a range of still-developing pedagogies, each adapting institution used the mentor's expertise as a general guide for its own distinct model.

I. PREFACE

Preface
Lessons from Lessons Learned

Even as FIPSE strives to bring about reform in postsecondary education, its own fund of knowledge and experience is constantly shaped and enhanced by the projects it supports.

A volume such as this one, which summarizes some of the best projects that we have funded in recent years, is as rich in lessons for FIPSE as we hope it will be for the field. It may be useful by way of introduction to identify some of these lessons. Some of them we at FIPSE have long known to be true. Others are as surprising to us as they were to the projects' creators. All will, we hope, prove helpful and encouraging to those who care about education.

When first conceiving a project, it is prudent to investigate first-hand the causes of the problem to be addressed. For example, the high college attrition of General Educational Development (GED) certificate holders is commonly attributed to the same lack of motivation that kept them from finishing high school. The director of the Mary Baldwin College project (p. 9), however, concluded after his own research that academic rather than motivational deficiencies caused GED holders to drop out of college. The rigorous program that he designed for inmates of a women's prison resulted in unprecedented levels of achievement and retention.

This project and the University of Virginia's Core Knowledge Foundation (p. 119) reconfirm the findings of many FIPSE projects—that ill-prepared or poorly-performing students learn best if they are provided solid academic content in an atmosphere of high expectations. For some students, however, the academic program needs to be buttressed with personal and financial assistance, as shown by Western Washington University's Law and Diversity Program (p. 17) and Prescott College's Center for Indian Bilingual Teacher Education (p. 195). This assistance works especially well when it takes into account the needs of the particular group. California State University, Fresno's project on academic literacy skills (p. 31), for example, includes information on academic culture in addition to language, because many of its students are the first in their families to attend college.

This volume abounds in lessons for international projects. In efforts that involve study abroad and collaboration with other institutions, simple is better. As the University of Connecticut's EuroTech (p. 155), San Diego State University's MEXUS Program (p. 175), and the University of Michigan's Business Assistance Corps (p. 169) demonstrate, the administrative complexities of such projects can become overwhelming. Getting students to go abroad and stay there long enough to profit from the experience poses significant problems. Projects such as EuroTech, where the stay abroad is built into the curriculum and is not likely to delay graduation, have the best chance of success.

The primacy of the faculty's role in educational reform is obvious to anyone reading these pages, as is the need to recognize and honor this role. Projects large and small—from the College of William and Mary's efforts to reform its advising system (p. 147) to the Missouri Coordinating Board for Higher Education's establishment of performance funding across state institutions (p. 211)—succeeded in great part because of the amount and quality of attention they paid to faculty.

Even the best-designed projects, however, occasionally run into faculty resistance. The American Association for Higher Education's Forum on Faculty Roles and Rewards reported greater openness to reforms on the part of administrators than on the part of the very faculty who were supposed to benefit from them. No matter how outstanding the innovation or how carefully it is introduced, resistance often crops up. California State University, Fresno, the University of Medicine and Dentistry of New Jersey, the Dickinson College Cluster, Cleveland State University—all these highly successful projects encountered some measure of resistance. The lesson for those contemplating a substantial innovation is to expect faculty skepticism, accept it as evidence of intellectual liveliness, and get on with the reform.

This volume of Lessons Learned, as did the three that preceded it, contains its share of surprises. Sometimes students reacted unexpectedly to well-intentioned efforts to help them—some refused to be mentored; others felt that faculty should be less lenient. An impeccably designed evaluation of a highly regarded faculty development method could not show that the method resulted in improved performance on the part of the students of participating faculty (Seton Hall University, p. 53). Evaluation of technology proved especially problematic. The staff of Tufts University's software evaluation project (p. 65) found it difficult to pinpoint how technology affects student learning. Projects using technology and discovery learning highlighted the differences between students who want to explore a subject for its own sake and those who want to get through the material as quickly as possible (see Tufts University's Perseus project, p. 113, and the Dickinson College Cluster, p. 247).

At California State University, Fresno (p. 31), on tests of academic language proficiency native English speakers performed no better than students with limited knowledge of English. And staff of California State University, Los Angeles's Project LEAP (p. 141) found that language-enhanced courses intended for non-English speakers benefited their English-speaking peers as well. Some reforms, such as Clemson University's Cooperative Chemistry Laboratories and Diablo Valley College's interdisciplinary physics and calculus curriculum, which were designed for a general student population, unexpectedly resulted in better learning and retention on the part of minorities and women.

All this strongly points to the conclusion that good teaching helps all students. But it is crucial to keep in mind that even projects with unassailable evidence of success can founder on the shoals of fiscal realities. Initiatives involving interdisciplinary teaching, extensive faculty-student contact, innovative uses of technology and other hallmarks of teaching excellence are often expensive. Although a tiny minority, some of this volume's most illustrious entries did not continue because of lack of funds.

Fortunately, these are the exception. Following in FIPSE's almost 30-year tradition, the great majority of the projects featured here were remarkably successful in generating additional funding from both institutional and external sources after the FIPSE grant expired.

Despite a few anomalies, the lessons gleaned from the projects described below are encouragingly familiar: that holding students to high standards works, that passionate, creative teaching is crucial, that difficulties will arise and can be surmounted, that excellent work eventually brings recognition and reward. As good educators know, the wheel of innovation eventually returns to confirm the wisdom of the ages. FIPSE is proud of its role in that cycle.

EULALIA B. COBB
PROGRAM OFFICER

II. ACCESS AND RETENTION

MACALESTER COLLEGE AND MOUNDS VIEW PUBLIC SCHOOLS

A Computer-based, Articulated Geography Curriculum K-14

Purpose

GeoLinks evolved out of a need for an outcomes-based, K-14 curriculum in geography that could be offered via electronic technology. Its creation coincided with three major developments in geographic education: the National Geography Standards, the Minnesota High School Graduation Standards, and new entrance requirements for the Minnesota State System of Colleges and Universities.

Macalester College, in partnership with Mounds View Public Schools, produced an electronic geography curriculum that not only conforms to national and state geography standards but was embraced by classroom teachers, allowing them greater flexibility in designing classwork that matches the standards.

Innovative Features

Because the high school outcomes had been previously established, the task was to determine GeoLinks' scope and sequence, i.e., the appropriate grades at which to introduce geographic concepts, and how best to reinforce them so that students would master the outcomes by the time they graduated.

GeoLinks consists of a set of 128 testable outcomes tied to the National Geography Standards—arranged in a K-12 sequence and defining what a student should know and be able to do after completing a high school geography course—and a diverse collection of geography lessons, units, and resources.

Most of the GeoLinks lessons are interdisciplinary, providing lessons about geography together with mathematics, science and reading. They were written and pretested in collaboration with hundreds of teachers from Minnesota school districts in the suburbs, the inner city, and rural regions, and with Russian teachers from Moscow State Pedagogical University. Writing the lessons required a prior evaluation of the preparation in geography that Minnesota teachers typically receive.

The creators of GeoLinks strove to include lessons that would also be useful to social studies teachers who have never taught geography before and to students with special needs. For teachers who do not have computers equipped with compact disc (CD) players, a special feature allows them to download portions of the curriculum from the CD to a diskette.

The GeoLink design allows teachers to locate lesson plans for teaching a particular set of outcomes to diverse groups of students. Its Hypercard software lets teachers use a few simple computer commands to sort through 1,022 geography lessons in 30 seconds or less. The lessons cover all grades, from kindergarten through high school, and include worksheets, quizzes, special readings, maps and color slides. They can be used by school districts creating new curricula, by teams of teachers developing shared lessons, or by individual teachers shaping their own year-long curriculum.

The lessons follow a standardized format, including objectives, classroom materials, teacher preparation, activities guides, and outcomes evaluation. Not only may teachers select lessons according to the national and state standards, but also according to learning style, cognitive level, grade level, key word, continent, intended outcomes, or a combination of these.

If, for example, a teacher would like illustrative lessons on post-Soviet Russia, she can find appropriate maps and slides with just a few key strokes. Once a teacher selects a standard, all the learner outcomes related to that standard are displayed on the screen. She selects the outcome that best fits her interests and local setting, starts a search, and waits while GeoLinks locates lessons for that outcome. Then she can either print out the lessons or copy them onto a diskette. This feature of "just-in-time publishing" allows teachers to print out only those worksheets or illustrations they need for a certain class from among the vast amount of information stored on the GeoLinks CD.

Evaluation and Project Impact

In 1994-1995, 1,978 students in twelve middle schools participated in an evaluation of GeoLinks as a classroom tool, using four schools as controls. GeoLinks users and non-users were given pre- and posttests in their geography courses based on the standardized test for intermediate grades developed by the National Council for Geographic Education. An item-analysis was conducted of the number of incorrect answers for each school, the difference in the class averages before and after the course, and the percentage difference of correct answers.

The analysis of the pre- and posttests turned up dramatic differences in student performance between those classes that used GeoLinks and those that did not. Correctly answered questions rose seven percent in GeoLinks classes and only two percent in non-GeoLinks classes.

Lessons Learned

Even though project staff put more effort into the project than they had originally anticipated, several problems hampered progress. The writing, editing, entering and proofing of the lesson plans proved to be an arduous task because the lessons were written by a wide range of teachers and the quality of the lessons reflected that range. Some of the teachers originally selected to write lesson plans either failed to produce them or submitted unacceptable ones—only half the lessons written for GeoLinks were suitable for inclusion. The apparent lesson about lesson plans is that it is necessary to recruit teachers with substantial experience and writing abilities.

Project Continuation and Recognition

In 1995, the Minnesota Association of Supervision and Curriculum Design named GeoLinks an "Outstanding Curriculum Project," and it was selected for inclusion in a special exhibition of innovative curricula at their national convention.

GeoLinks is now self-supporting, having been nationally disseminated without additional grant funds from FIPSE or other federal agencies. The fees from GeoLinks site licenses enabled the project to maintain a half-time staff associate to continue the diffusion effort during 1997.

The curriculum was originally designed to be operated by the Hypercard software package that is available at no cost for all teachers who have Macintosh computers. To broaden the curriculum's usefulness, GeoLinks has been redesigned to operate on a Web site and thereby be accessible through either Macintosh or Windows machines. New lessons have been added to this edition, and there are plans to produce low-cost simplified, diskette versions of GeoLinks by grade level for individual teachers.

In 1998, a summer institute for teachers interested in teaching advanced placement geography continued to articulate the electronic geography curriculum from elementary grades to college by producing a model AP course for students.

The gap between K-12 and postsecondary geography instruction was identified in the initial grant proposal. Faculty from Macalester College and Minnesota State University, Mankato, ran faculty development seminars for geography professors and social studies teachers to build a connection between the K-12 curriculum and first year college courses. This resulted in a new FIPSE- and National Science Foundation-funded program for preservice teacher training at Minnesota State.

Dissemination

At this time, approximately 800 sites across the nation have purchased licenses for the curriculum, which is available to every teacher at these sites. Several states have purchased licenses to use the curriculum in their resource collections. The number of teachers using the CD could not be monitored easily. However, assuming that at least two teachers taught 100 students per year for three years in these 800 schools, at least 480,000 students have used GeoLinks lessons.

Information about GeoLinks has been communicated to diverse educational audiences through numerous national and state conventions, such as those of the National Diffusion Network, the National Geographic Society, the National Council for Geographic Education, the Minnesota Education Association, the Minnesota Council for Social Studies, the Minnesota Educational Computing Corporation, and many others.

GeoLinks was also disseminated through direct mail, telephone, e-mail, press releases, training sessions, interviews, and articles, and was featured in every recent issue of *The Geography Connection*, the newsletter of the Minnesota Alliance for Geographic Education. The National Geographic alliances have included GeoLinks in their resource collections and summer institutes, and it now has its own Web home page. Free workshop demonstrations have been offered to Twin Cities schools.

Teacher training with GeoLinks has been incorporated into GeoTeach, the FIPSE-funded preservice training project underway at Minnesota State University, Mankato.

Available Information

Articles about the new curriculum have appeared in the *Journal of Geography*, the *MEA Advocate*, *Geography in Schools*, and *National Geographic Update*. Information about other GeoLinks-related articles, catalogs, and multimedia and videodisc compendiums for education and training is available from:

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MARY BALDWIN COLLEGE
Development of a Series of Liberal Arts Courses to Strengthen the College Performance of High School GED Graduates

Purpose

In 1988 Mary Baldwin College, in collaboration with the Virginia Department of Correctional Education, began to offer college courses leading to a B.A. at a women's prison. Soon, however, high rates of early attrition became apparent, primarily among holders of the General Educational Development (GED) certificate. In the first four years of the B.A. program, 45 percent of the GED students withdrew during the first semester for reasons other than parole. After three semesters, only 38 percent of GED students persisted.

This was not unusual. Although research on GED tests shows that they function well as evidence of readiness for work, most students now take them for college admissions, and college attrition among GED holders ranges between 60 and 90 percent. The grade point average of GED students who persist to graduation, on the other hand, does not differ significantly from that of other students--probably because the massive early attrition weeds out all but the most able.

The high college attrition among GED students was attributed in the literature to the same low motivation which had caused these students to withdraw from high school. But the project director suspected that this was not the case for the Mary Baldwin students, because motivation is generally high among prison inmates.

It seemed plausible that the academic preparation of GED students was related to their lack of success in higher education. The passing standards for the GED, which vary from state to state, are often quite low. In Virginia, it is possible to pass the mathematics test while failing all algebra and geometry questions, and to receive no credit on the essay and still pass the writing test. Knowing this, some preparatory programs omit instruction in these topics altogether.

The project director felt that it was unreasonable to expect two or three months in even the best GED preparation program to replace two or three years of daily academic work. A look at the characteristics of students who persisted versus those who dropped out of the prison program showed that, indeed, the determining factor was dropping out of high school prior to entering the 12th grade. Clearly it was academic rather than motivational factors that needed to be addressed to help GED students to succeed.

Innovative Features

The project—funded by FIPSE along with the American Bar Association, the Presbyterian Women's Thank Offering, and the Titmus, Kates, and Beasley Foundations—consisted of three courses taken by GED students concurrently with initial college enrollment.

In creating the courses, project staff made a number of assumptions regarding the academic shortcomings of GED preparation. They expected students to have no experience in critical reading of and writing about book-length texts. They assumed little knowledge of world literature and history, algebra, geometry, and probability, little preparation for testing other than multiple choice, and no experience with classroom discussion or interdisciplinary thinking.

The three resulting courses concentrated on specific academic skills and content and demanded more reading and writing than many college courses. They were as follows:

1. The Ancient and Medieval Worlds. This course examined the roles of men and women at different historical times and in different cultures and different views of the "virtue" of patience. Students read *The Odyssey*, *Ruth*, *Job*, Plato's dialogues about the death of Socrates, Murasaki Shikibu's *Diary*, Kamo Chomei's *Hojoki*, *The Canterbury Tales*, and a play by Shakespeare. Writing, which was taught by the traditional rhetorical approach, included eight short essays, several tests, and two oral reports.

2. Modern American Voices. This course focused on race and social class in American culture in the context of the relationship between the social sciences and the humanities. Students read *The Adventures of Huckleberry Finn* against the background of the political rhetoric of Lincoln and Douglas. They read Flannery O'Connor, Toni Morrison, Alice Walker, and Lee Smith in the light of sociological theory on race, gender and family. They read the lyric poetry of Emily

Dickinson, T.S. Eliot and Gwendolyn Brooks, and the speeches of the Civil Rights movement. They wrote essays on these texts and developed one into a research paper.

3. The Scientific Method. This course, which began with Descartes's *Discourse on Method*, investigated the mathematical and philosophical underpinnings of the natural sciences. It examined basic algebraic functions and formulas as they relate to chemistry; the course also examined probability theory as it applies to genetics and intelligence and graphs and statistics. Students read *The Double Helix* and *The Mismeasure of Man*.

Students could begin the course sequence at any point. Because of high retention, there were soon more applicants than the courses could accommodate, so they were admitted on the basis of conduct, which allowed project staff to observe students with a wide range of preparation and GED test scores.

The course sequence was also offered, on a one-time non-credit basis, to GED students enrolled at three local community colleges.

Evaluation and Project Impact

The retention of 89 GED holders during the three years following the inauguration of the project course sequence at the prison was compared to that of GED students enrolling in the college program's first four years. Prior to the project courses, first-semester GED students consistently withdrew at rates between 42 and 52 percent. During the project period, on the other hand, first-semester GED students withdrew at rates between zero and nine percent.

Eighty-five percent of GED enrollees in the project completed the fourth semester, compared to only 34 percent during the first four years of the collegiate program. In addition, the first-semester GPAs of project students were much higher than in previous years (2.34 versus 1.59). (The improved GPA was not solely dependent on the project course grade—when that grade was removed, the GPA still averaged 2.27.)

At the community colleges, a comparison group of 48 GED holders volunteered to make their enrollment data available. Eighty-five percent of the 39 project students completed the first semester, compared to only 50 percent of the control group. By the end of the third semester, 74 percent of the project students were still enrolled, versus 42 percent of the control group. Although the effects of the project courses were less remarkable with the community college population, they nevertheless conferred a retention advantage of approximately 35 percent on their students compared to the controls.

Among the prison population, by the third semester there were few differences in achievement and retention between project students and their predecessors, bearing out the research that shows that GED students who persist do relatively well in later semesters. However, a comparison of the total number of women enrolled in college—including both those who were still in and those who had left prison—showed that 90 percent of the women in the project courses were continuing in higher education three semesters after initial enrollment, compared to only 38 percent of those who had not participated in the project.

The project course helped significantly with mathematical and writing skills as well. Students took the quantitative section of the Scholastic Assessment Test (SAT) at the beginning and at the end of the Scientific Method course. Their scores increased from a mean of 331—well below the level required for college courses—to 457 (the median, 450, is the minimum required by Mary Baldwin for admission to college algebra).

A random sample of student essays from the project courses was rated by a group of experienced English teachers on a scale of zero to ten, on criteria ranging from syntax to spelling and content. First semester students scored an average of 3.4; second semester students, 5.9; and third semester students, 7.7.

Participation in the program also correlated with lower recidivism. In Virginia, 49 percent of released women prisoners return to prison within two years (for those without a high school diploma, the rate is 60 percent). Twenty-nine percent of women who enrolled in a project course but dropped out before completing the first semester were reincarcerated, while under 11 percent of those who completed one or more semesters returned to prison within two years.

Although during their first semester students received as many disciplinary sanctions as they had during the previous three months, in later semesters their misconduct levels decreased by more than half. This came as a surprise to prison staff, who had expressed concern that college students would become disciplinary problems.

Persistence in the project courses seemed to decrease the dropout rate of the women's children as well. The children of GED-holding incarcerated mothers dropped out of school at a rate of over 32 percent, and the children of mothers who did not complete their first semester in the project dropped out at a rate of 35 percent, but the children of those who completed at least one semester in the project left school at a rate of only 14 percent.

Lessons Learned

Research shows that many GED students are quick to become discouraged and abandon their studies for good. A successful first semester, on the other hand, often leads to continued enrollment, and the project's retention figures reflect this.

The higher retention among the imprisoned students may be due in part to less reliance on adjunct faculty and to the use of conduct as an admissions criterion. Most significantly, however, in prison there were few competing demands and few alternatives, whereas in the community colleges the hurry-up-and-get-through-it mentality that often prevails among adult students caused many to choose less demanding classes.

Student evaluations of the Ancient and Medieval Worlds and Modern American Voices courses were highly positive, although less so for the sections on T.S. Eliot and political rhetoric. The Scientific Method course had to be substantially revised to provide more non-mathematical context and thus motivate students to learn the mathematical content. In retrospect it appears as though, given the quantitative deficits of these students, the sequence should contain two mathematics courses.

Students showed a startling lack of preparation in algebra—not one of those in the first offering of the Scientific Method Course could solve either $x+2=4$ or $2a=4$ in a pretest. They experienced high math anxiety and thought that mathematics was something done for its own sake, with few applications to the real world.

The magnitude of the academic deficits of GED students was such that at first it prevented them from putting their life experience to use in the classroom. They were incapable of participating in class discussion. They failed to relate opinion to fact and took disagreements personally, often storming out of class in anger. Reading primary texts and writing about them proved overwhelming and so did examinations—students could not answer identification questions with complete sentences or organize responses to essay questions into paragraphs or even sentences. They could not relate texts read in class to outside sources or ideas, and when they eventually began to do this, the papers became, for a time, chaotic.

Higher education seems all too willing to respond to the demands of adults who want college credentials quickly and with as little effort as possible. Students with academic ability and considerable life experience may succeed in such programs, but clearly few GED students can. They require a slower track with, at first, lowered expectations to ensure success.

Project Continuation

The college's B.A. program at the prison and the community college program have been canceled due to lack of funds. The three project courses, however, continue to be offered at the prison under a contract with the Virginia Department of Correctional Education. Supplemented with workshops on college admissions, financial aid, and college-related skills, the courses are available to women who will be released within a year. Evaluation is continuing.

Dissemination and Recognition

The program has been the subject of a number of presentations in the United States and Canada.

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WESTERN WASHINGTON UNIVERSITY
Law and Diversity Program

Purpose

It is a documented fact that in the United States people of color and other minorities are both underrepresented in the legal system and have little faith in it. To achieve proportional representation in the legal field today, the number of Asian American lawyers would have to double, the number of Hispanic lawyers more than triple, and that of African American and Native American lawyers quadruple. As minority populations all but double over the next 50 years, their underrepresentation in the legal profession may worsen dramatically.

The Law and Diversity Program seeks to meet this need by recruiting minority and non-traditional students who have either not considered entering the legal profession or who need to improve their skills in order to gain admission to law school. The program provides an academically demanding environment where the students' perspectives are valued and their needs for various kinds of support are met.

Innovative Features

The Law and Diversity Program was created at Fairhaven College, an interdisciplinary college of Western Washington University dedicated to innovative approaches to education. Most Fairhaven students design their own academic concentrations, a structure that easily accommodates the project's pre-law curriculum.

The program recruits non-traditional and minority students—those whose perspectives and experiences have been traditionally underrepresented in law schools, the legal profession and the law. Its graduates include African Americans from crime-filled urban neighborhoods, a

Chamorro woman from the Northern Mariana Islands who became the first native lawyer on her island, a refugee from the civil war in Eritrea, former gang members, single mothers, mature students, students whose backgrounds include poverty, rape and abuse, and activists from the disabled and gay communities.

When they begin the program after completing their general education requirements, students become members of a two-year learning community. Law and Diversity Program students often show academic promise but have marginal records and tend to give up when studies become demanding. The program's cohort system helps them to succeed despite the rigorous material, while the common curriculum allows them to form close ties with faculty and to synthesize their learning.

Given their adverse personal and financial circumstances, many of the program's students require support, both emotional and economic, from faculty, from mentors and role models, and from each other. Faculty coordinate efforts with the financial aid office, the registrar, the counseling center and the writing center to ensure that help is available. The admissions office assists in recruitment, and the development office raises funds (for emergency loans, scholarships and other forms of assistance) from private individuals and local law firms.

The curriculum consists in part of core courses, taught by two instructors who share a full-time appointment. These instructors also teach the integrative seminar, serve as "master learners," and offer advice and personal support to students. The rest of the curriculum is made up of existing courses in a number of different departments, which Law and Diversity students take as a group along with the general university population.

Before designing the program, faculty consulted with representatives of local law schools and were advised that it was more important for the curriculum to emphasize verbal, analytical and research skills than to teach a specific body of knowledge. Accordingly, faculty selected challenging, skills-intensive courses that introduce students to the U.S. legal system, familiarize them with basic legal concepts and terminology, and place the law in its social, historical and political context.

The curriculum includes, among others, courses on American legal and political systems, political economics, race, politics and public policy, and logic and problem solving. The constitutional law course has proven particularly effective for law school preparation. In it students use Gerald Gunther's constitutional law casebook in small question-and-answer groups.

The quarterly integrative seminar is designed to synthesize knowledge, discuss law school admissions and focus on specific skills. The last seminar deals with the law as a profession.

The curriculum not only demands considerable amounts of writing and critical thinking but also allows students to participate in one or two mock arguments and have exposure to basic legal research. The courses vary from year to year but their challenging nature and their focus on communication skills remain constant.

The final quarter consists of an intensive internship. Students work as clerks in law firms, courts, and city, state and federal legal offices. They also serve in investigative positions with the public defender's office, as legal advocates for victims of domestic violence, and in other positions at the American Civil Liberties Union, lawyer referral services, disability rights groups and juvenile detention facilities.

Students receive various forms of help in applying to law school. Faculty make pertinent materials available and arrange for students to visit nearby law schools and attend classes. Because program faculty know their students well, they are able to write detailed letters of recommendation. Because many students apply with below average numerical indicators, the letters address the students' actual performance on relevant topics. A commercial provider of an LSAT preparation course makes it available to each cohort for a fraction of the $795 fee.

Evaluation and Project Impact

The efforts to gauge the effects of the project included student self-assessments, focus group assessments by faculty and students, writing portfolios, LSAT preparation and scores, a video documentary, retention and academic performance data, and interviews of all 29 alumni and of faculty and staff of the law and graduate schools in which they enrolled.

Project staff compared the students' diagnostic LSAT scores, taken prior to the start of the preparation course, to the final scores. The mean score for students in the two cohorts went from 136 to 145, and from 139 to 146 respectively, raising the mean percentile for both classes 19 points. For the students who went to law school, the improvements were even more dramatic, with percentiles rising by as much as 25 points.

Retention statistics are also encouraging. Of the 29 students participating in the Law and Diversity Program, 93 percent completed the program and 96 percent the bachelor's degree. This compares quite favorably with the university's minority junior-to-senior retention of 54 percent for those who entered as freshmen, and 48 percent for transfers.

Of the 29 students tracked, 16 applied to law school and 12 were admitted, and of these, by the end of the project, all but one were still attending or had graduated. Two students went to graduate school, and five obtained law-related jobs. The rest were studying to retake the LSAT and pursuing other interests and jobs. Most intended to continue their education.

Students felt "satisfied" to "highly satisfied" with the program and thought the cohort experience valuable, despite conflicts that arose in the second cohort. They appreciated the faculty's care and support but criticized what they felt was their excessive leniency. Although they thought that it needed more focus and structure, students found the integrative seminar useful.

Faculty and staff at the graduate and law schools that graduates of the program attended stated that the students had been well prepared. Indeed, most were performing above the traditional numerical predictors of academic success.

Law students felt that the program had trained them adequately, although they stated that more work on specific skills—such as methods of case analysis—and more counseling on the isolating and competitive nature of law school would have been helpful. One student, who had the lowest LSAT score in her entering class, submitted the top paper on the first legal writing assignment and, at the end of the first year, ranked 90th out of a class of 216. Another student, with LSAT scores in the 55th percentile, finished the first year in the top 15-20 percent of the class.

Many alumni are active in community service, working with youth athletic programs, juvenile offenders, victims of domestic violence, migrant farm workers, homeless youth, AIDS education in minority communities, and gay and disability rights issues. Students attending law school become involved with campus organizations—some of which they have started themselves. They also study abroad, write for law reviews and work as interns and clerks.

In 1996 the Council of the American Bar Association's Section of Legal Education and Admissions to the Bar issued a statement regarding preparation for legal education that echoes many of the provisions of the Law and Diversity Program. The assertion that "difficult courses from demanding instructors is the best generic preparation for legal education" especially reflects the convictions of the creators of this project.

Lessons Learned

Project staff did not find it easy to recruit students of color into the program, because the community where the university is located is predominantly white, and the student population is only 13 percent minority. This also made it difficult to find local minority lawyers and judges and firms to provide internships. Fortunately, lawyers and judges in metropolitan areas of the state readily offered assistance.

From the beginning, discussion of the issues surrounding diversity was a fundamental feature of the program. It soon became obvious, however, that students did not spontaneously understand the commonalities among all forms of oppression and tended instead to engage in a comparison of oppressions, with the cohort eventually fragmenting into groups segregated by race, gender and sexual preference. In the future, much of the first quarter will be devoted to helping students develop the ability to understand and support each other despite their differences—a skill which is being increasingly recognized by law schools as essential for good lawyering.

Instead of receiving standard grades, in some Law and Diversity Program classes students wrote narrative self-evaluations to which the instructor responded. It soon became apparent that students were putting more effort into their regularly-graded classes because they assumed that law school admissions relied heavily on grade point averages. In fact, law schools did not view self-evaluations as problematic. Staff informed students of this and instructed them on how best to present their self evaluations in applications. They are also providing an application cover sheet explaining the purpose and use of self-evaluations.

Despite the virtues of the cohort system, staff became aware of the need to better integrate Law and Diversity Program students with the rest of the campus, and to offer special advising to those who, while enrolled in the program, discover that law school is not for them. In response to students' desire to pursue areas of individual interest, staff decided to grant later cohorts flexibility in the second year to take several courses outside the Law and Diversity curriculum.

To better accommodate law school application cycles, faculty changed from the traditional fall-winter-spring academic year to a winter-spring-fall schedule. Applications are normally prepared in December, which, under the traditional system, gave faculty just four quarters to work with students prior to writing letters of recommendation. In the modified year, on the other hand, students have nearly finished the sixth and final quarter by the time they apply to law school. (After completing the Law and Diversity Program, students may take further courses if they choose.)

Project Continuation

The project has continued since the expiration of FIPSE funding, with the third cohort continuing the high retention of its predecessors and graduating in June of 1997. The university converted the program director's full-time faculty position to tenure-track. Two other faculty members also participate in the program.

Dissemination and Recognition

Faculty and students made presentations at a number of conferences, and their remarks led to discussions about adapting the Law and Diversity Program to other campuses. Audiences generally felt that the model's interdisciplinary requirements would preclude its being adapted in its entirety but perceived the cohort and skills development approaches as having considerable potential for replication. While the program at Western Washington University focuses on pre-law preparation for minority and other disadvantaged students, staff believe that the model, or parts of it, can work for any group of students.

The project received Western Washington University's Diversity Achievement Award.

Available Information

Further information may be obtained from:

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WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION (WICHE)

Balancing Quality and Access: Reducing State Policy Barriers to Electronically Delivered Higher Education Programs

Purpose

Problems of access to higher education are most often associated with issues of race or economic status. In the western states, however, these problems are compounded by geography. There, even well prepared students are often stymied by the difficulty of getting themselves to the classroom where what they want to learn is being taught. In the case of individuals from disadvantaged backgrounds, the added obstacles of distance and weather often prove insurmountable.

It is hardly surprising, then, that western states have emerged as leaders in distance education, developing a sophisticated telecommunications infrastructure over the last two decades. The approach to distance learning, however, varies greatly from state to state. Some states envision distance learning strictly as a means of serving students in outlying areas, while others have created major statewide programs and still others have specifically designated certain institutions as providers of distance education.

The policies regulating this multitude of options, especially when offered by out-of-state providers, are just as varied. While some states require only registration of out-of-state programs, for example, others insist that such programs be licensed. Many others waive the licensing requirements if the programs are offered by an accredited institution. To complicate matters further, when the Balancing Quality and Access Project was conceived there existed no agreed-upon criteria for assessing distance learning, and the procedures of regional accreditation associations and state regulatory bodies were not coordinated.

Clearly, if students were to take full advantage of the flood of advances in distance education, it was necessary to address the barriers imposed by interstate policy, and especially the need for standards with which to judge the quality of these programs. That is what this project intended to achieve.

Once the project began, however, it became apparent that the question of interstate policies was less crucial than it had first appeared. For while it is theoretically possible to control the offerings of an out-of-state institution if they are received at, for example, a local community college, at home students can have unlimited access to programs on cable television or on the Internet. As a result, many states accept all out-of-state programs offered by accredited institutions.

In addition, the decision by the Western Governors' Association to develop a virtual institution, the Western Governors' University, offered a means of addressing the issue of interstate compatibility in the future. The university, which will eventually award its own credentials based on outcome assessments, will function as a regional broker of courses, learning modules, and degree programs offered by colleges, universities and companies, thus eliminating all barriers to interstate distance education.

At the same time, as they began to play a more important role in helping states to approve out-of-state distance education (12 of the 15 WICHE states used accreditation as the principal criterion for granting approval), the regional accrediting associations became more interested in assessing the quality of distance education. The accrediting agencies looked to this project to help establish specific distance education standards.

While the concern over interstate regulatory policies diminished, however, the need to ensure quality in programs made available through technology became preeminent. The project's creators realized that their most significant task would be to help learners to evaluate and select distance education programs. Hence, the project's new focus became such questions as whether or how a student engaged in distance learning would have direct access to faculty, what kind of academic advising and support services would be available to him, and whether he could count on the originating institution's commitment to offer the program for as long as he required it.

Innovative Features

The project's originators began by documenting existing state regulations and practices about degree programs delivered electronically from out of state. They surveyed and interviewed personnel of state higher education regulatory and governing offices and reported the results in a publication entitled *When Distance Education Crosses State Lines: Western States' Policies*.

Project staff then proceeded to develop the "Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs." They achieved this through a consultative process, circulating and revising drafts in the light of comments from the WICHE Advisory Board, the regional accrediting agencies, and state higher education executive officers in the western states. State higher education agencies in turn distributed drafts to local colleges and universities, and WICHE disseminated preliminary versions of the principles through its paper and electronic media.

The principles, which address entire programs rather than individual courses, are based on the assumption that the institution and its electronic curricula are accredited by a nationally recognized accrediting body. The principles cover curriculum and instruction, evaluation, and institutional context and commitment—including institutional role and mission, faculty support, resources for learning, student services, and commitment to distance learning programs.

Project Impact

The Principles of Good Practice have become the basis for national agreement on the standards for education delivered through technology. They have been endorsed by state agencies, regional higher education groups, and the regional accrediting associations.

Eight western states—Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota and Washington—have in various ways incorporated the principles into their review and approval processes for in-state programs. The Western Legislators' Conference passed a resolution encouraging member states to consider adopting the principles as the basis for in-state assessments. The Western Governors' University will stipulate that all whose courses and programs are to be listed in the WGU online catalog must certify their adherence to the principles.

The impact of the principles has been felt outside the West as well. The Southern Regional Education Board adopted a set of principles for participation in its Electronic Common Market with wording almost identical to the Principles of Good Practice developed by this project. The regional accrediting associations' national Task Force on Distance Learning endorsed the principles, as did all individual regional accrediting commissions, most of which included the principles in their handbooks.

Seventeen out of 19 professional associations contacted by project staff requested information and are considering incorporating the principles into their standards policies. The National Association of State Approving Agencies also adopted the principles' basic philosophy, and *Virtual College*, a publication designed to accompany Peterson's *Guide to Colleges and Universities*, endorses the principles as tools for judging quality.

Lessons Learned

California, whose rules governing out-of-state providers have long been among the strictest in the West, is closing down its state licensing and regulatory agency. This development confirms the project staff's belief that across the nation future efforts will focus on educating students about their choices rather than on attempting to regulate program providers.

Dissemination and Recognition

It was a major goal of the project to have the principles become the standard for discussions of quality in distance education, both in the West and throughout the country. To ensure this, staff mailed a one-page brochure on the principles to WICHE commissioners, to other regional higher education organizations, to state higher education executive and administrative officers, to college and university presidents, and to the initiators of the Western Governors' University.

Project staff published articles in *Change* and other magazines, made conference presentations, contacted professional accrediting associations, and educated students with two booklets, entitled *Distance Education: A Consumer's Guide—What Learners Need To Know*, and *Good Practices in Distance Education*. Numerous requests for copies of the principles led to a second stage of dissemination as recipients incorporated the principles into their own work and republished them in journals and newsletters.

Available Information

Additional information may be obtained from:

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Assessment of Academic Literacy Skills: Preparing Minority and Limited English Proficient (LEP) Students for Postsecondary Education

Purpose

Despite important recent strides in diversifying the means of instruction, college students still acquire most of their education by listening to lectures and reading textbooks. Yet the language of lectures and textbooks is radically different from that spoken on a daily basis by most students and their families. This difference is often at the root of serious academic difficulties. Academic language, which includes words and phrases common to all fields, is used in lectures and texts to teach the technical information of each discipline. Because the elimination of books and lectures is neither feasible nor desirable, we can expect that students who come to campus already familiar with academic language will continue to enjoy a clear advantage over those who do not.

Students with academic language deficiencies come from varied backgrounds. Some are native English speakers, while others speak a different language at home and, despite having had all their education in the United States, are only marginally proficient in English. Whatever the reason for the problem, colleges and English as a Second Language (ESL) programs generally rely on standardized multiple choice tests to determine whether to accept these students, where to place them, and when they have satisfied exit criteria. The native English speakers are likely to be placed in remedial courses, whereas the U.S.-educated non-native speakers are usually steered into ESL classes intended for international students, whose needs are entirely different from theirs.

The standardized tests, for which students may prepare by undergoing expensive coaching and memorizing lengthy word lists, are unrelated to the actual language tasks required in college and have only low to moderate correlations with college grades. They also underpredict success for minority students, women, and ESL students. The composite numbers reported as test results give no information about the nature of the strengths and weaknesses of the individual.

The goals of this project were to develop an assessment of students' academic language proficiency and a curriculum to improve their academic language skills.

Innovative Features

The assessment and the curriculum developed for this project are both based on videotaped college lectures and excerpts from college textbooks. The curriculum focuses on the major language differences between under-prepared and well-prepared students. These differences were determined through detailed analyses of field tests of 700 college and high school students, representing a wide range of background and preparation levels.

To create the pre- and posttests the project director first studied the nature of the language used in college courses, and defined the language tasks required in college. Project staff videotaped eight 30-minute lectures and selected one for the tests, while others became the basis for the curriculum. The test lecture focuses on a topic, theories of learning, that the students are not likely to have encountered before. The test lecture is difficult enough—in its proportion of academic vocabulary, speed of delivery, and sentence complexity—to avoid a ceiling effect in grading, and it is well organized, with cues for important topics and repetition of key points.

The tests consist of the following elements:

1. Lecture notes. Students watch a lecture excerpt (with an introduction that includes an overview of the topic, key vocabulary, and instructions for note taking) and take notes. These are scored holistically for inclusion of the most important information and for evidence of such skills as using abbreviations and indicating relationships among topics.

2. Short answer questions (based on the lecture). Scored for precision, vocabulary, grammar and spelling, this task indicates comprehension and requires students to synthesize information from the notes, using their own words.

3. Dictation of lecture sentences. This exercise is scored for correctness of academic vocabulary and for word endings, which correlate with other indicators of academic language proficiency (whereas minor misspellings do not).

4. Self assessment of academic vocabulary (reading and dictation). Field test results revealed this as a valid and reliable method for assessing vocabulary knowledge. Students rate their level of knowledge of each of 25 read or dictated words on a one-to-five scale. Students

are generally more confident about the words they read than the words they hear, perhaps because exposure to academic language in high school occurs more through reading than through oral use. This indicates that practice with lectures is important for students with academic language deficiencies.

5. Sentence completion (reading). This exercise evaluates the ability to recognize the correct morpheme endings of common words. Students read simplified passages related to the lecture and for certain words select the correct ending that fits the sentence.

6. Reading importance. In passages from textbooks related to—but not repetitive of—the lecture topic, students underline the twelve most important propositions.

7. Notes from reading. After the underlining task, students take notes from an excerpt of the reading selection. The notes are scored for the presence of important information, evidence of note-taking skills and absence of verbatim copying.

8. Short answer questions (based on the reading). The reading excerpt is collected, and students answer a general question using only their notes. This writing sample and the lecture writing sample are scored on a ten-point rubric for writing correctness and for content accuracy.

After the tests are scored, each student receives an individual report which shows his or her strengths and weaknesses and, in the posttest, relative progress. There is no combined, overall or passing score, because this would result in the loss of specific information about students' strengths and weaknesses. Normative information for interpreting test results is provided on the student score reports.

The curriculum emphasizes academic vocabulary because the initial field tests revealed that its absence constitutes by far the most important barrier to the comprehension of lectures and text. Students learn prefixes, suffixes and roots that indicate meaning. They also learn the nominal, verbal, adjectival and adverbial forms of a word and markers that indicate plural, past tense, or gerund forms. To help remember the meaning of new words, each is marked with an icon representing one of eleven semantic categories such as person characteristics; cause, effect and change; evaluation and description, and so on. Each lesson has a dictionary in which new words are defined in non-academic language, and used in context.

The lessons also provide instruction on note-taking, on recognizing the markers of lecture organization, and on reading strategies such as identifying important information and analyzing complex sentences. Because many students who need this kind of assistance are also the first in their families to attend college, the curriculum includes information on academic culture.

Evaluation and Project Impact

The assessment and curriculum have been implemented at various levels at 19 sites, including high schools, community colleges, and universities.

One group of community college students served as controls by taking the pretest and the posttest before and after their first two semesters of college with no exposure to the project curriculum. The results showed that merely attending college classes has no measurable effect on the academic language skills development of underprepared language-minority students and that practice on the tests alone, without benefit of the curriculum, does not increase scores. Academic language scores for these students showed a moderate negative correlation with the number of units dropped during the two semesters. In other words, the lower the academic language proficiency, the more units students withdrew from during the year. This suggests that low academic language skills are related to low persistence and low achievement for beginning college students.

The longest use of the assessment and curriculum so far took place in a large, predominantly Hispanic, rural comprehensive high school with a 50 percent graduation rate. During 1996-97, 103 students took the pretest, and 84 the posttest. The results show that, after exposure to only three of the eight lessons—taught part-time over five months—the students made significant progress, especially in taking notes from lecture and reading and answering a reading question using their notes. There were also significant increases in self-ratings of vocabulary knowledge and small increases in other areas of the test.

In a college remedial reading class, attendance and retention changed from extremely poor to perfect when the project curriculum was introduced, and students found the curriculum valuable and interesting. Most importantly, scores in the posttest showed significant increases in academic language skills.

Results from an Upward Bound program site showed statistically significant increases in academic language test scores. Interviews with students at this site revealed positive changes in their attitude about and knowledge of academic language and academic culture. Students reported that the course helped them improve their grades and skills in their high school classes.

Students enrolled in an anatomy and physiology course at one four-year institution were given academic language assessment tasks and the results were compared with their course grades. Correlations ranging from .35 to .50 were found between the various academic language tasks and the course grades. Students who received passing scores in the course had significantly higher academic language scores than those who received a D or F in the course. All students who completed the course had higher academic language scores than did students who withdrew from the class during the semester.

In summary, in all contexts where the assessment and curriculum were used, students made significant improvements in their academic language proficiency and had positive attitudes toward the course. Evaluation evidence suggests that academic language proficiency is related to persistence and academic achievement in postsecondary education.

Lessons Learned

Before the assessment and curriculum could be implemented, project staff had to overcome certain obstacles related to prevalent theories and traditional attitudes toward language learning and remedial instruction.

Study skills teachers generally are not keenly aware of the actual requirements of regular college courses, and most base their teaching on the book and on their intuition—as opposed to factual information about what students need to know. In ESL classes, there is often even less awareness of what students need to succeed in college. Often, as ESL students become more orally fluent they are mainstreamed, without assessment of their writing and other academic proficiencies, which likely lag behind.

The whole-language approach, which holds that literacy, like spoken language, develops simply through exposure, has often resulted in the neglect of specific instruction in reading, phonics, spelling and writing skills. Although many teachers are moving away from this approach, there is still resistance to such techniques as vocabulary instruction and skills-based approaches based on expository text.

Academic language development is a long-term process. The curriculum and assessment created during this project aim to give students the tools to continue learning new vocabulary and overcoming their weaknesses long after the course is over. The project should continue to bear fruit as these students advance through the academic ranks.

The results of this project confirm the notion that academic language is, in a sense, a second language for most students. On the pre- and posttests, the profiles of native speakers of English and of students classified as fully English proficient and limited English proficient were almost indistinguishable. In fact, in some tasks students with limited proficiency had slightly higher scores than the other groups—possibly because of better schooling in their first language.

The curriculum is effective only with a teacher who understands the language needs of students and who is enthusiastic and effective. A teacher who does not engage and motivate students, showing them the relevance of academic language tasks, will not see much improvement.

Project Continuation and Dissemination

The curriculum continues to be disseminated and its effectiveness documented based on teacher and student reactions. The materials have been used by, among others, several university Upward Bound programs and at sites in several school districts.

The project received a new grant under FIPSE's 1997 Comprehensive Program competition to disseminate and evaluate the program's effectiveness more widely. The new evaluation efforts include looking for long-term effects on students. At some sites the course may be expanded to a two-semester sequence.

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III. IMPROVING TEACHING AND LEARNING

AMERICAN ASSOCIATION FOR HIGHER EDUCATION
Forum on Faculty Roles and Rewards

Purpose

It is difficult to think of a way to improve learning that does not have the faculty at its core. In view of this, the American Association for Higher Education (AAHE) established the Forum on Faculty Roles & Rewards to begin a national dialogue on strategies to engage faculty more fully in their work.

The dialogue began at a time when colleges and universities faced diminishing resources, anticipated mass retirements and subsequent faculty shortages in many fields, and felt intensified public demands for increased access and accountability. The threat of outside controls on such issues as student testing, faculty workloads, and fiscal management loomed larger than ever.

While these troubles darkened the academic skies, however, they also created an ideal climate for the forum; faculty and administrators, disciplinary associations, and other higher education entities joined in the dialogue with an intensity born of the conviction that the essence of academic life was at stake.

Innovative Features

The forum was proposed in 1991 to address an emerging national issue: colleges and universities across the country were reexamining faculty expectations, evaluation and rewards, and legislators and boards of regents were beginning to raise serious questions about faculty workload and productivity. The mismatch between the fundamental missions of many institutions—particularly the commitment to quality undergraduate teaching—and the rewards being provided to faculty was of primary concern. The forum set out to provide direction and practical guidance for campuses, especially those with complex missions, interested in reexamining faculty priorities. The forum sought to address the needs of institutions that wanted to expand the notion of scholarly work beyond the traditional research-focused model to include teaching, research, and service. The forum also sought to provide additional career-path options to new faculty and to face the issues presented by the impending generational changing of the guard among the faculty.

But the forum did not simply hope to emphasize the need to reward fine teachers with external perquisites such as salaries and tenure. Its real intention was to find ways of integrating teaching, research and service so that faculty would receive *internal* rewards as well and would reap the sense of personal engagement and fulfillment that is the only guarantee of lasting quality.

Concerns about evaluating and rewarding teaching had been growing since the 1970s. The forum, however, envisaged a national conversation around fresh formulations of these problems. Thus, for example, it determined to reexamine the old scholar-researcher model not just because more attention must be paid to teaching, but because the model has proven unnecessarily unidimensional. By rewarding only a narrow range of behaviors, the scholar-researcher model cheats academia of some of its most creative and talented contributors. It ignores the "ways of knowing" that expert practitioners develop over a lifetime, for instance, or the special talents required not only to create knowledge but to present it in a meaningful manner to audiences both in and outside the university.

To stimulate and sustain the national conversation on faculty work the forum relied on tools that had served AAHE well in the past: annual conferences, publications, and the services of a clearinghouse of information.

The conferences were designed to attract the academic leadership (i.e., the chief academic officer and the leader of the faculty governance body) of institutions whose faculty were expected to function as both teachers and scholars. To influence perceptions of the seriousness and importance of the forum's work, the conferences featured nationally recognized authorities.

In addition to numerous articles in AAHE publications, the project yielded three monographs: Jon Wergin's *The Collaborative Department*, on departmental responsibilities in defining and rewarding faculty work; Ernest Lynton's *Making the Case for Professional Service*, on the need for rethinking the service component of faculty duties; and Robert Diamond and

Bronwyn Adam, eds., *The Disciplines Speak*, on the definition of scholarship. AAHE has recently published a companion volume to the Lynton monograph, *Making Outreach Visible: A Guide to Documenting Professional Service and Outreach*, by Amy Driscoll and Ernest A. Lynton, and discussions are underway regarding the publication of follow-up monographs to both the Wergin and Diamond and Adam publications.

Finally, the forum built a clearinghouse that includes campus documents and articles from the press and answers hundreds of requests annually. Its staff are in wide demand as consultants on campuses where the dialogue on roles and rewards is being translated into practice.

Evaluation and Project Impact

The forum's timeliness as well as the quality of the conversation it instigated earned it an enthusiastic response in the higher education community. In fact, the problems that the project encountered had mostly to do with the volume of the response. The annual conferences attracted many more participants than anticipated—the fourth one reached the 1,000-registrant mark—and many institutions sent teams of faculty to each one. Over three years, more than 800 requests came in to the clearinghouse for resources, speakers and information.

Some institutions that sent representatives to the conferences, such as the University of Wisconsin, have since started their own meetings on faculty roles and rewards. Others, such as the University System of Georgia, have integrated forum concerns into their planning documents. Forum topics and conclusions also inform the programs of bodies such as the American Association of Schools of Business, the American Association of Medical Colleges, and the Council of Independent Colleges.

As the forum continues with a second three-year grant from FIPSE (see below) and its conclusions are applied on campuses across the nation, it will gradually become possible to judge its concrete effect on the lives of faculty and on their students' learning.

Lessons Learned

The forum's creators were surprised to find that the group they had expected to be the most recalcitrant to their ideas—academic administrators—was in fact the most eager to embrace them. Well acquainted with external pressures for accountability, budgetary realities and a shrinking faculty market in many fields, deans and provosts readily grasp the need for change.

What resistance there is lies at the discipline and department level, which most faculty consider their professional "home." Recognizing the importance of making progress in this area, during the second three-year project the forum is focusing on the disciplines and the departments.

With regard to affecting the views of individual faculty, the forum's organizers quickly realized that having institutional teams attend the conferences allows faculty to exchange ideas with each other and generates a level of enthusiasm that administrators would have difficulty creating on campus.

During the course of the project it became apparent that one of the main uses of the forum is as a link among campuses that are trying out new ideas in relative isolation. It also became clear that although it was desirable for the forum to expand to include a variety of institutional types (and at present it is doing just that—see below), the nature and needs of two-year colleges call for a separate discussion of roles and rewards for their faculties.

Finally, the creators of the forum concluded that the concept of "service" is in need of revision. The higher education community must come up with a broader, more flexible definition—one that will encompass the many ways in which faculty members can engage in their professional as well as their social communities.

Project Continuation

With a second grant from FIPSE, the forum has nearly completed its second three-year period, focusing on disciplines and departments in the hope of achieving a direct impact on faculty. It has broadened its appeal to include "New American Colleges"—former liberal arts colleges with newly-diversified missions—and professional schools. The forum is expected to become self-sufficient at the close of the grant period.

Dissemination and Recognition

Two additional projects originated from the forum's agenda and are in progress. "From Idea to Prototype: The Peer Review of Teaching" continues the examination of teaching portfolios among other strategies and has obtained funding from the Pew and Hewlett foundations. "New Pathways: Faculty Careers for the Twenty First Century" is expected to yield 14 working papers by its completion, on such topics as career transitions for senior faculty, and reconciling work and family.

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COLD SPRING HARBOR LABORATORY

A Training Program for Small College Faculty in DNA Manipulation and Human Genetics

Purpose

Medicine, law, religion, civic life, family life, education—there is hardly an area of contemporary existence that has not been touched by advances in molecular biology and by the Human Genome Project in particular. As we enter the next century, this impact will continue to grow. Not only will today's students be affected personally by applications of molecular genetics, but those entering the workforce in agriculture, medicine, manufacturing and law will need a basic knowledge of DNA science to exercise their professions.

The single most likely place for students to at least begin to gain this knowledge is in introductory biology courses. Crucial for biology majors, these courses may be even more important for non-majors, because they are often the last exposure to the life sciences for these students. The nationwide Coalition for Education in the Life Sciences is especially concerned that students in these courses experience a worthwhile laboratory experience—something difficult to achieve in view of the large enrollments in these classes and the nearly universal funding shortages.

Faculty in charge of these courses are feeling pressure to improve the laboratories—specifically, to introduce laboratories in molecular genetics—from an unexpected source: their students, many of whom received this kind of instruction in high school. The Educational Testing Service now mandates DNA restriction analysis and bacterial transformation experiments in the advanced placement biology curriculum. It is reasonable to estimate that as many as 75,000 precollege students are exposed to laboratories in molecular genetics every year.

Responding to these demands poses special problems, however, for faculty at institutions where they are expected to devote themselves to teaching. Over the years, they may have lost touch with current research and may lack the confidence to develop appropriate experiments, especially given the scarcity of laboratory equipment and resources at many such institutions.

The ultimate goal of this project was to introduce exercises in basic gene manipulation in first- and second-year college courses, thereby imparting "genetic literacy" to students and stimulating their interest in the life sciences. To achieve this, the project intended to give the teachers of these courses hands-on experience in molecular genetics through a series of laboratories focused on a simple prokaryotic system designed for large numbers of students.

Cold Spring Harbor Laboratories' DNA Learning Center was particularly qualified to carry out this task. Not only was the Laboratories' director, James Watson, co-discoverer of the structure of DNA and founding director of the National Center for Human Genome Research, but many gene manipulation techniques basic to the genome project were developed at the laboratories, which also have a long and distinguished history of involvement in biology education.

Innovative Features

In the years just before the project, Cold Spring Harbor Laboratories' DNA Learning Center, the nation's first institution devoted exclusively to public genetics education, developed and tested two basic molecular genetics curricula. The first, "DNA Science, A First Course in Recombinant DNA Technology," is intended for advanced high school students and stops short of the DNA hybridization techniques needed to isolate a single gene from a library of genes. The second, "Laboratory DNA Science, An Introduction to Recombinant DNA Techniques and Methods of Genome Analysis," features more advanced experiments related to the Human Genome Project, allowing for the construction and analysis of gene libraries. Together, the curricula can take a college freshman or sophomore with no previous knowledge of the subject to a comprehensive understanding of modern methods for isolating and analyzing genes.

The curriculum's laboratories use *E. coli* and its endogenous virus, *lambda*, to illustrate the techniques used in the analysis of eukaryotic genomes. Because of the bacterium's fast generation time, small genome, and ease of manipulation, it can be used to introduce sophisticated molecular techniques without the technical and regulatory complexities of working with human DNA.

The laboratories' designers sought to modify current research protocols to minimize expense and ensure safety and reproducibility. And they strove to preserve the integrity of the research methods involved so that students going on to more advanced situations would not need to relearn them. Adapting research techniques to the teaching laboratory was no easy matter. For example, to simplify the interpretation of experiment results, DNA Learning Center staff developed three new plasmids which transform well, are highly amplified in *E. coli*, and give consistent yields in plasmid preparations. These are probably the only DNA molecules specifically engineered for educational purposes.

Because the new protocols are biochemically complex and require novel reagents, the DNA Learning Center collaborated with a number of corporations to redesign research-grade kits for education. They also issued a license to a commercial supplier to market two polymerase chain reaction kits—stand-alone experiments that employ simplified protocols and inexpensive substitutes for equipment, reduce preparation time, and are straightforward to use. One kit allows students to amplify a segment of their own DNA using a polymerase chain reaction.

The faculty development workshops that project staff created to ensure the broad dissemination of the curriculum were intended to put DNA manipulation technology within the reach of any motivated college instructor. The workshops built on the introduction to DNA provided by most standard survey texts. The laboratories presupposed no prior knowledge of molecular technology, and they proceeded cumulatively, repeatedly bringing major techniques into play to allow participants to gain confidence in their use.

Training was offered in two sets of intensive ten-day summer workshops located at major universities. The workshops were held at Howard University and the University of Chicago the first summer and at Columbia University and California State University, Northridge, the second. The host universities were chosen because they were accessible to faculty from a large number of institutions and because their prestige would attract applicants and underscore the rigor of the experience. Winter follow-ups were held in the same locations. Workshop staff consisted of a senior instructor, a coordinator, and a college intern who served as a laboratory aide.

The workshops featured 22 experiments. They began with an introduction of basic techniques of microbial culture and proceeded to agarose gel electrophoresis, DNA restriction and ligation, and plasmid isolation. These techniques were then extended to gene library construction and screening, Southern hybridization, polymerase chain reaction, and human DNA fingerprinting.

In addition, lectures related the laboratories to the Human Genome Project and to genetic medicine. Local academic and industry researchers gave seminars on applications of the laboratory techniques presented. And participants discussed the ethical, social and personal issues raised by the ability to manipulate the human genome, as well as the financial, scheduling and safety issues involved in teaching the new laboratories.

The follow-up workshop was intended to reinforce faculty confidence and to explore in more detail the practical aspects of laboratory-based teaching in genetics. It included three entry-level experiments that used elements of the laboratories presented during the summer: E-Z DNA recombination, restriction mapping, and forensic plasmid identification.

Evaluation and Project Impact

The workshops attracted a total of 84 participants. 75 percent of them were white, 16 percent black, 5 percent Asian, and 4 percent Hispanic. Sixty-three percent were male and 37 percent female, reflecting the makeup of the applicant pool. Forty-three percent came from colleges with under 5,000 students, and four out of ten came from institutions half or more of whose students were minority or disadvantaged. Two out of ten came from institutions where 20 percent to 49 percent of the students were minority or disadvantaged. Two-thirds of the home institutions were public; one-third were private.

Participants were surveyed before and after the workshop, and again 17 months after the experience. The surveys generated a 79 percent response which revealed that the curriculum had been well received—due in part to the experiments' 80 to 100 percent success rate, one result of their thorough prior testing. Faculty suggested modifications to the schedule to reduce confusion caused by overlapping experiments. They were particularly pleased with the seminars and discussions on the social, ethical and legal repercussions of genetic technology and the history of the eugenics movement in the United States.

The majority of participants reported that they had incorporated two to three laboratories into their teaching in the year after the workshop and planned to incorporate more as equipment and reagents became available. Entry-level laboratories (bacterial transformation and DNA restriction analysis) were the first to be used. Half of the participants had made presentations on workshop topics to their colleagues, ten percent had made presentations at professional meetings, and ten percent had led teacher training workshops.

Predictably, faculty stated that the main constraint to teaching laboratory-based molecular genetics was the lack of equipment. But here again there may be cause for optimism—half of the respondents attempted to obtain funds or equipment donations for the new laboratories and succeeded to the extent of matching FIPSE per-participant costs at a seven-to-one ratio.

The DNA Learning Center continues to track faculty in the original and following workshops in ways comparable to the tracking of 2,000 high school teachers who received professional training from the center. The resulting database should yield a useful picture of genetics instruction at the advanced high-school and beginning college level.

Lessons Learned

Perhaps because of the absence of direct participant support, applicant response to the workshops was less than half of the response to similar programs offered by Cold Spring Harbor Laboratories. Staff had geared the workshops strictly to teaching and had to carefully screen out the many applicants who wanted to learn DNA techniques for their own research. In choosing the participants, staff selected not only for motivated applicants but for "motivated institutions"—those who showed a willingness to offer their faculty the kind of support they would need to integrate the workshop's teachings into their own courses.

Project Continuation

Due to lack of funding, the workshops are no longer offered.

Dissemination

Laboratory DNA Science: An Introduction to Recombinant DNA Techniques and Methods of Genome Analysis, by Mark V. Bloom, David A. Miklos, and Greg A. Freyer was published in 1995 and incorporates feedback from workshop participants.

Available Information

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SETON HALL UNIVERSITY
Assessing the Teaching and Student Learning Outcomes of the Katz/Henry Faculty Development Model

Purpose

The Katz/Henry model of faculty development, Partners in Learning (PIL), evolved during a decade-long collaboration between Joseph Katz and Mildred Henry which was supported by one of FIPSE's first grants in the early 1970s. In the late 1980s PIL, financed by the New Jersey Department of Higher Education and administered by the Woodrow Wilson National Fellowship Foundation, was disseminated among public and private postsecondary institutions in New Jersey. Now PIL is housed in the New Jersey Institute for Collegiate Teaching and Learning, at Seton Hall University. Over the last decade, PIL programs have operated on 27 campuses in New Jersey and involved over 500 faculty.

Fully described in Katz and Henry's 1998 book, *Turning Professors into Teachers*, PIL is unique among faculty development methods in that it focuses on student learning and is based on classroom interactions. Concerned with process rather than goals, the model is faculty-run, non-judgmental, and encourages innovation and exploration. It seeks to reinvigorate faculty and alleviate the stresses and isolation of the classroom.

Faculty pair off and exchange observer-observed roles in the classroom on a term-by-term basis. The faculty pairs meet frequently, interview students several times, and join other participating colleagues for general discussions of teaching-related matters.

According to prior evaluations of Katz/Henry programs, faculty felt that they had made significant improvements in their teaching, but these self-reports could not be verified. The increasing concern with the quality of instruction and faculty development, combined with decreasing financial resources at most institutions, prompted the director of this project to try to find out whether there was in fact a link between the PIL approach to faculty development and student learning.

Innovative Features

Twenty four faculty from four institutions—Rutgers University, Newark, Bergen Community College, the County College of Morris, and Kean College—participated in the assessment. Mostly Ph.D. holders, they came from all ranks and averaged 19 years of teaching experience, ranging from six to forty years. Some had considerable faculty development experience, while others had only recently become interested in improving their teaching. Still others appeared somewhat disinterested but were motivated by the stipend and release time offered to participants.

Faculty were coupled in three interdisciplinary pairs per institution, typically a social scientist and a natural scientist. Each pair's work revolved around a focal course—an introductory-level offering that was part of the observed instructor's regular load. The partners interviewed a minimum of three students three or four times per semester, kept a journal of their observations, and attended monthly sessions at the New Jersey Institute for Collegiate Teaching and Learning to discuss their experiences and explore innovative pedagogies.

Two of the three pairs on each campus were active in years one and two and fallow in three. The remaining pair (the control) was fallow in year one and active in years two and three. Data were collected on fallow pairs in year one to establish the baseline control and on fallow pairs in year three to determine the persistence of change.

Students were surveyed with pre- and posttests regarding their preference for class structure and teaching style, their interactions with faculty and their experiences in the course, faculty teaching behaviors and their impact on learning, personal and intellectual changes resulting from the course, and progress in academic skills. The posttest also included an academic achievement question—graded anonymously by the course instructor—to reflect the students' mastery of the subject matter. Responses to this question were controlled for level with the students' GPA and college placement test scores.

Project staff observed faculty in the classroom a minimum of three times per semester. They looked for clarity, enthusiasm, organization, and pacing of the delivery, and interaction and rapport with students. Course syllabi were collected and analyzed, and each participant was interviewed. In addition, faculty completed two attitudinal surveys closely resembling the students' posttest.

Project Impact

Most faculty believed that as a result of PIL they had increased the diversity of their teaching strategies—especially using more active learning approaches—and their awareness of their influence over students. They also stated that because of the program they understood better how students learn and improved their relationships with colleagues as well as their teaching.

Students agreed that their instructors had changed, citing more and better interactions with them and higher academic expectations. But they reported perceiving no significant changes in in-class teaching behaviors or personal or intellectual changes as a result of being in the course. There were no discernible patterns of increased academic achievement in the students of participating faculty, even when controlling for ability.

Using informal interactions with faculty, the journals, and the exit interviews, staff plotted each faculty participant on a grid illustrating the perceived degree of change in teaching and the amount of personal reflection about the process. Three clusters emerged—those at the low end of the scale, labeled "resisters," those in the middle of the grid, the largest number, labeled "moderate changers," and those at the upper end of the scales, labeled "converts." Staff then used the students' and faculty's self-reports to test these designations. On the whole, the typology was not supported: distinguishing between faculty types based on the students' responses or the faculty's self reports was, with few exceptions, impossible.

Lessons Learned

Project staff speculate that the inconclusive results of the assessment may be due to the failure to select the appropriate outcomes. Faculty enter a project such as this one with highly individual and idiosyncratic goals, and these goals are not likely to be reflected in the few general outcomes selected for assessment. Another important factor is the nature of the population—the faculty who chose to undertake PIL were for the most part committed to good teaching and thus less likely to show dramatic growth than a randomly-selected group.

A number of factors made implementation difficult. To maintain PIL's non-evaluative tone, it is important that faculty set their own agenda and rules, with minimal intervention from the project coordinator. In an assessment situation, however, this makes control of the "treatment" all but impossible. During the project, events such as sabbaticals, illness, changes in teaching load, and schedule and personality conflicts conspired against consistency.

It was challenging to keep faculty motivated to participate and furnish data over three years. But it was even more challenging to collect academic data from students, who were not especially interested in providing it and received no encouragement from their instructors. Faculty were reluctant to take up course time with project-related activities, and, despite the fact that students signed a consent form, faculty members said they felt that it was unethical to ask them to provide academic data that were not relevant to the course.

The project generated massive amounts of data from different sources and in different forms. These were hard to analyze in a meaningful way, especially when quantitative and qualitative data differed on the same issue.

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SOUTHWEST TEXAS STATE UNIVERSITY
Interactive Video Listening Comprehension in Foreign Language Instruction: Development and Evaluation

Purpose

According to recent research, the ability to understand a foreign language in its spoken form leads to proficiency in speaking and writing that language. Listening comprehension is now widely believed to be the primary mechanism by which learners acquire competency in foreign languages.

During the last two decades, computer-assisted language learning has played an increasing role in foreign language instruction. Especially where listening comprehension is concerned, highly individualized interactive videodisc programs offer important pedagogical advantages over traditional audio approaches. The computer—a patient tutor ever at the student's beck and call—permits instant and repeated access to precisely defined video sequences that focus attention on specific linguistic features and supports the student's progress by comprehension checks and a wide array of other pedagogical features.

Such programs are rare, however, and on the whole computer instruction has failed to reach its full potential in the foreign language classroom. Most generic computer programs offer little more than simple drills that match neither the instructor's nor the students' needs. Unfortunately, many foreign language faculty lack both the expertise to write computer programs and the time in which to learn to do so.

Authoring systems, by eliminating the need to program the computer, allow faculty to develop multimedia lessons which focus on listening comprehension and match their—and their students'—specific requirements. This was the goal that project faculty set for themselves when they created Libra.

Innovative Features

Available in both Macintosh and IBM-compatible versions, Libra consists of a series of templates for basic expository displays, various question formats with feedback, and help features such as scripts and dictionaries. It allows the creation of multimedia controls, dialog boxes, hyperactive texts, response-sensitive lesson controls, links to graphics, digitized audio and video, and World Wide Web documents. At all times during the development of a lesson the author sees exactly what the student will see. Each authoring tool is designed to enable faculty to assemble lessons which model appropriate listening comprehension strategies and guide students in their use.

Research shows that presenting certain kinds of information (known as "advance organizers") concerning the story that students are about to view helps them to construct a meaningful mental representation of the text. Thus, Libra's text tools allow displays which introduce the story and its setting. Schematic displays of pictorial cues reveal the narrative structure of the text and help students to relate the text's components to each other to form a coherent overview of the story. Icon buttons representing the events in the text can be arranged in patterns reflecting the text's narrative structure. And authors can construct text maps which portray linear plot progressions, causal chains, and other narrative structures.

Effective advance organizers underscore key information in the story and prepare students for expressions that may be difficult to understand. Libra can create hyperactive text displays linked to explanatory devices such as videodisc events or digitized audio files. Students click the underlined expressions and hear them as they are spoken in the video scene, replaying them as needed.

According to the findings of linguistic research, individuals skilled in comprehension use flexible strategies at several levels of text processing. Libra allows faculty to direct students both to developing their general understanding of the text and to processing specific information from it through five kinds of comprehension checks that verify students' understanding of general as well as specific information.

Libra offers a number of help features. For students who have difficulty identifying relevant sentence constituents, the system's ancillary stacks contain templates to develop displays which provide a progressive buildup of a complex sentence, accent its important components, and show their interrelationships. Hyperlinked words or expressions offer additional help displays.

The ancillary stacks also allow creation of a help display equipped with a set of video buttons to delimit videodisc segments which contain important information. Finally, Libra's script-building tools can be used to develop written scripts of the video text.

Upon completion of the authoring system, project faculty produced and piloted three sets of multimedia lessons based on authentic video materials in French, German and Spanish. Faculty at three other institutions produced and piloted additional lessons in these languages.

Evaluation and Project Impact

Project faculty evaluated lessons developed with Libra as well as the authoring system itself.

Data about the impact of Libra on learning came from French and Spanish lessons developed at four institutions, ranging from a highly selective private university to an open-admissions community college. Data were also collected on German lessons developed at Southwest Texas State, but because their design did not follow the suggested guidelines, the results did not reach statistical significance.

In one study, the performance of students using Libra-authored lessons was compared to that of peers using more traditional video and computer pedagogies. The students in the experimental groups understood significantly more of the video material, wrote higher quality free-recall protocols, and made fewer interpretation errors than their peers in the control groups.

In another study, the experimental group worked with a Libra-authored interactive videodisc while the control group viewed a linear videotape of the same narrative, supplemented by a paper replication of the computer instruction material used by the experimental group. In the last three of a series of five quizzes on listening comprehension, the experimental group outperformed the control group at a statistically significant level. The absence of a statistically significant difference between the results of the first two quizzes may have been due to some students in the experimental group not being aware initially of all the pedagogical devices in the Libra-authored lessons.

In a similar test at another institution, the experimental group consistently outperformed the controls. Two other tests of improvement of listening comprehension (conducted without controls) showed that comprehension increased by 73 percent and 86 percent after using the Libra lessons.

All students surveyed stated that they enjoyed using the Libra-authored lessons, and more than three-quarters believed that the lessons had helped them to improve their listening comprehension. A pre-post comparison of attitudes toward using the technology shows a strong positive shift, with over half the students selecting the highest rating on a five-point scale and describing themselves as "enthusiastic" about the lessons after having used them. Students using linear videotape showed much less change in their attitude.

The authoring system itself was evaluated by means of a written questionnaire administered to 60 foreign language educators trained by project staff. The respondents ranged from graduate faculty to middle school teachers, and from computer novices to expert users. Libra received highly favorable ratings, especially on questions regarding ease of learning and using the system and the degree to which it met the individual instructor's needs (about eight on a ten-point scale).

Lessons Learned

Initially project staff estimated that it would take ten hours a week over a year and a half to develop Libra. In fact, they spent a minimum of 15 hours weekly discussing, expanding and improving the system. But they believe that this careful work in the early stages was crucial to the system's success.

Project Continuation

Libra continues to be used at Southwest Texas State, and project faculty have developed over 50 lessons in French but few in German or Spanish.

Dissemination and Recognition

An article entitled "The Instructional Basis of Libra" appeared in the *Journal of Language Learning Technologies*. Project staff demonstrated the system at meetings of the American Council on the Teaching of Foreign Languages, the Computer Assisted Language Instruction Consortium, the South Central Association of Learning Laboratories, and the South Central Modern Language Association. They continue to offer authoring workshops to faculty at academic institutions and professional meetings across the country. Two hundred-fifty faculty have purchased Libra.

In 1994 the university won a second grant from FIPSE to disseminate Libra to institutions across the United States. Several faculty groups participating in the dissemination workshops obtained up to $70,000 in local funding to continue their work.

Recently the project obtained a third grant of $430,000 from the U.S. Department of Education's International Education Office to continue this work and extend it to reading comprehension.

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TUFTS UNIVERSITY
Detailed Evaluation of a Novel Approach to Curricular Software

Purpose

Exploding numbers of underprepared students and shrinking budgets are only some of the factors that make teaching on American campuses today increasingly difficult. Under these conditions, it is only natural for faculty and administrators to turn to the computer for the solution to problems ranging from cost effectiveness to remediation.

Educational software holds immense promise for solving these dilemmas and improving teaching and learning, but it is difficult to design, requires costly equipment, and demands considerable adjustment in the way that faculty teach. Given the weight of these investments and the growing popularity of computers in the classroom, it is imperative that new software receive a thorough and uncompromising evaluation.

From 1987 to 1990, with FIPSE funding, the Curricular Software Studio at Tufts developed ConStatS, a software package to help introductory statistics students to assume an active, experimental style of learning. The designers of ConStatS believed that developing this learning style was essential to the acquisition of a deep conceptual understanding of the subject. Every ConStatS program is divided into many screens, each of which confronts the student with a small number of closely related decisions. The student's choices lead down different pathways, some of which loop into each other. At any point, the student can back up along a pathway, or use the WHY and HELP buttons available on every screen to obtain additional information.

Although, during the original project, formative evaluation showed that ConStatS was free of bugs and students felt comfortable using it, its creators wanted to find out whether the experimental approach that the software fosters made a difference in learning. They also wanted to find out how students used the software and which portions of it worked with what type of students, especially underprepared ones. Finally, they wanted to provide an example of good software evaluation, a model that would focus on comprehension and retention rather than on student attitudes and speed of learning, as much technology assessment does.

Innovative Features

Several factors made it imperative that the evaluation include a number of sites. Project staff wanted to find out whether ConStatS would help students in different courses, different departments and different institutions to learn statistics. Besides, if only one or two sites were used, factors unique to the course or the institution could overly influence the results, a common defect of technology evaluations.

Accordingly, staff recruited faculty at the University of New Hampshire, Gallaudet University, Colorado College, and Bowdoin, in addition to Tufts, to use ConStatS as they saw fit. This flexibility in how the software was used made faculty at all five sites eager to cooperate. Unfortunately, it was not possible to recruit a community college, perhaps because these institutions offer fewer statistics courses and have less technology. Overall, 20 introductory statistics courses participated in the project. Sixteen used ConStatS and four did not.

Because faculty use ConStatS in many different ways (Tufts alone has eight introductory statistics courses in various departments, all of which employ ConStatS differently), the evaluation needed to include a record of how the program was used. Project staff used a multivariate assessment measure to capture the effectiveness of each part of the program and performed detailed testing and extensive monitoring of implementation.

During the first year of the project, staff developed a pretest of the skills necessary for students to use ConStatS and a detailed test of conceptual understanding that assessed every part of the program, to be taken by students in the twenty participating courses. They also designed a feature in the program for recording how each student used the software. The test of conceptual understanding required a detailed analysis of over 200 ConStatS screens, which yielded over 1,000 comprehension points. Because it was impossible to test all the points, they were grouped into clusters, which in turn yielded 103 concepts. For each concept, a question testing understanding was formulated and then reviewed by two outside statistical experts and teachers of quantitative methods.

Designing the feature for recording interaction required describing the kinds of interactions offered by ConStatS and linking them to the educational purpose that motivated each one—such as executing an experiment, asking for help, or studying a result. The next step involved engineering a software tracing function that would capture each interaction, interpret it, and include it in a database. This permitted project staff to account for differences in performance based on differences in use.

All participating faculty were given a one-day workshop before the evaluation began. Project staff communicated biweekly with all the sites, and made visits to install the program and perform related tasks. In the second and third years of the project, students in the 20 participating classes took the test of conceptual understanding, which consisted of questions on 103 statistics concepts taught both in the software and in the classes that did not use the software.

Project Impact

The evaluation results strongly suggest that ConStatS makes a big difference—students using ConStatS did better on 94 out of the 103 questions testing understanding of statistical concepts. These results do not appear to be due to increased learning time, because at least two courses substituted a computer laboratory for a class. Nor are they tied to a particular way of integrating ConStatS into the curriculum, because the results were comparable among classes with different approaches.

Students with poor mathematics backgrounds achieved fewer gains than better-prepared students. A ten question pretest examining basic mathematics proficiency (middle- and high-school levels) predicted accurately which students would gain most from ConStatS at all sites, perhaps because low scores on the test were symptomatic of serious academic deficits. It is possible, however, that if students had been tutored in fractions and ratios (the two most commonly missed items on the pretest) they would have shown greater gains from ConStatS.

The trace data enabled staff to connect differences in class scores and software use. Some classes made more extensive use of certain portions of the program than others. Also, trace data allowed the linkage of student performance to the different ways in which individual students used the software. In general, students who tended to stay in one spot in the program or moved slowly were less likely to be engaged by ConStatS and learned less from it.

The evaluation confirmed the project staff's impression that most students leave introductory statistics with little conceptual understanding of the material. Students who did not use ConStatS averaged only 31 percent on the test of conceptual understanding. Even though scores were substantially higher in classes that used ConStatS, students were still not learning statistical concepts as well as they should have.

Lessons Learned

Project staff had expected the evaluation to reveal ConStatS to be an unqualified success. Instead they learned that, although the software is undoubtedly useful, students failed, for unknown reasons, to learn a number of concepts. Some of the handsomest illustrations in the program, the ones that received the most acclaim at conferences, did not promote learning. It is difficult, staff found out, to anticipate how students will learn from a given illustration.

The hope that all students would engage in active experimental learning with the help of well-designed software was not completely fulfilled, because students with learning deficits showed only a marginal gain. For students whose mathematics background was appropriate for college-level work, however, ConStatS was helpful.

Project Continuation

The software continues to be used at Tufts in psychology, economics, biology and civil engineering courses.

Dissemination and Recognition

ConStatS has been the subject of many conference presentations and a number of articles in refereed journals. It was published by Prentice-Hall, Inc., in 1996.

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WEST VIRGINIA UNIVERSITY
Development of a Computer System to Educate Students to Evaluate and Interpret Published Drug Studies

Purpose

Despite the efforts of peer reviewers and editorial boards, it is not unusual for errors in research design and inconsistencies in reporting to surface in professional pharmaceutical and medical journals. If patients are to receive appropriate treatment, it is essential that medical professionals be capable of thoroughly and accurately interpreting the primary literature on drugs.

Nevertheless, the education of students in the techniques of appraising drug studies has typically received short shrift in many health sciences curricula. Often, the checklists, scoring systems and algorithms available to assist medical personnel to evaluate clinical drug studies are brief and do not adequately explain the concepts involved.

Faced with the need to teach students to analyze drug literature, project faculty reasoned that it would make sense to use computer assisted instruction (CAI), because the computer allows for numerous examples and levels of explanation that students can access and review as needed. Faculty also believed that CAI would promote active learning in a curriculum that students mastered mostly by listening to lectures and memorizing facts.

Innovative Features

Faculty developed a self-contained interactive CAI program, entitled "Evaluation of Clinical Drug Studies," initially to be used in conjunction with a one-credit course, Introduction to Drug Literature. However, the program has also been used as an independent two-credit course. The program teaches students to analyze and evaluate all aspects of published clinical drug studies, with a focus on drug efficacy. It can be used to replace class lectures. The program features sound as well as graphics and includes presentation of material, examples, questions, and responses. Students can choose to review prior lessons or progress to new ones.

The project started with a three-day training offered by the manufacturer of Authorware Professional 7 (Macromedia, San Francisco, Calif.), the software chosen for the program. This user-friendly software only requires knowledge of computer basics and allows the incorporation of sound, graphics and animation.

Because the "Evaluation of Clinical Drug Studies" material had not been taught before, the team of faculty developers first had to outline the course and prepare the text. Three consultants and a senior pharmacy student reviewed the CAI materials at different stages in their development.

The program consists of 16 sections and subsections on topics such as experimental design, study settings and patient factors, measurements, statistical concepts and analyses, and data handling. Students were given basic instruction on the computer and then assigned in groups of two or three to a computer. Each group received a different published clinical drug efficacy study to review as part of the course. Six exercises during the semester asked questions about the study and helped faculty evaluate students' comprehension of the program. Students were expected to cover one section of the program per week on their own. About 15 minutes a week of class time were initially allotted for questions and discussion of the program.

Evaluation and Project Impact

A pretest and a posttest were administered to a control group and a test group of students.

The control group consisted of 77 pharmacy students taking Introduction to Drug Literature the year before CAI was introduced. These students had had no formal instruction in drug study evaluation. The pretest was designed to measure their understanding of important characteristics of clinical drug studies and their ability to analyze and evaluate them. A similar posttest was administered at the end of the course.

The test group consisted of 76 students enrolled in Introduction to Drug Literature with the CAI component. The pre- and posttests were almost identical to those given to the control group.

Both groups had similar age and GPA profiles. Slightly more students in the control group had prior experience with statistics or research methods than those in the test group. Although this was expected to yield better pretest scores on the part of the control group, the test group's scores were higher by two percentage points.

The mean posttest scores of the test group showed a significant increase over the pretest scores—from 43.6 percent to 77.4 percent. The posttest scores of the control group unexpectedly declined. This proved to be the result of anomalies in the administration of the test. When corrected for these anomalies, the resulting scores were quite similar—43.8 percent in the pretest versus 42.2 percent in the posttest. Similar tests administered to a later class of CAI users exceeded the first year's findings: students scored an average of 42 percent on the pretest, and 83 percent on the posttest.

Faculty had estimated that the CAI program would take about 15 hours to complete Students, however, turned out to be less assiduous than expected, spending a total of 11 hours on average, with a minimum of four hours and maximum of 25 hours. Almost all students skipped at least one section, and nine percent skipped more than half of the program.

At first glance, only a weak correlation emerged between the total time spent on CAI and the posttest scores. However, there was a considerable difference between the time spent on the CAI program by students with the highest versus those with the lowest posttest scores. Those with scores of 90 percent and above spent on average at least ten hours more time on the CAI program than the students with the lowest scores.

Student attitudes toward the program were measured by four surveys administered over one semester. Despite complaints that they did not receive enough credit given the additional load represented by the program, students generally felt that the information they were learning was new, of high quality, and geared to the appropriate level. They liked the CAI screen design and the way in which information was presented. They were almost equally divided on whether they preferred learning through lectures or through CAI. Despite the agreement among pharmacy educators about the need to learn to evaluate drug studies, some students felt that the program, although appropriate for physicians and researchers, was not necessary for them.

Lessons Learned

Although Authorware7 is relatively easy to use, it took faculty longer than expected to master it. That and a number of contretemps such as having to re-size each screen to match the monitors of newly-acquired computers caused faculty to put in approximately 50 hours of preparation for every one of the program's 15 hours. An instructional designer would have shortened the process considerably, by assisting faculty with screen layouts, font and color selection, and proper use of the software.

Project Continuation

The CAI program continues to be offered as a large part of the Introduction to Drug Literature course, which now carries two credits. Students spend approximately one hour per week on the program and one hour in classroom activities, a portion of which is devoted to exercise review and question and answer sessions related to the CAI material. The program is now available in a Macintosh and Windows version and can be accessed via the Internet.

Dissemination and Recognition

Version 2.0 of "Evaluation of Clinical Drug Studies," which is copyrighted, has been distributed to a number of institutions. It is being used in West Virginia University's baccalaureate and doctor of pharmacy curricula, and has been used for distance instruction at Oregon State University, for distance and on-site instruction at Duquesne University, and for pharmacist training in literature evaluation techniques.

The subject of a number of presentations (to the American Association of Medical Colleges and the Symposium on Computer Applications in Medical Care among others) and publications, the program received one of the first three annual "Innovations in Teaching" awards from the American Association of Colleges of Pharmacy.

Project faculty obtained a grant of $5,000 from the pharmaceutical manufacturer Astra Merck to work on a condensed practitioner's version of the program. An expansion to include critical evaluation of pharmacokinetics studies has captured the interest of the Drug Information Association, which should yield opportunities to use the program in government agencies and the pharmaceutical industry.

At West Virginia University, the recent conversion to a six-year pharmacy curriculum will place more emphasis on clinical expertise—and therefore on the need to critically analyze drug studies—than was the case in the past. An additional FIPSE grant to institute computerized problem-based learning (PBL) at the school of pharmacy should also help to continue to change student attitudes toward the use of computer instruction.

The latter grant is designed to integrate the educational methods of PBL and concept mapping with computer technology, to use the advantages of each. Ten multidisciplinary PBL cases—including concept maps for case objectives—have been developed and field tested in medicinal chemistry, pharmaceutics, and clinical sciences. The cases are currently in their second year of use and evaluation.

Available Information

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IV. CURRICULUM AND INSTRUCTION

COLUMBIA UNIVERSITY COLLEGE OF PHYSICIANS AND SURGEONS
Electronic Basic Medical Science Core Curriculum

Purpose

There is a growing realization that only a fraction of all available biomedical knowledge can be mastered by even the most able medical students. Beyond the difficulty of grasping so many thousands of facts and principles, medical students also need to learn to apply them critically while analyzing medical literature. How should medical schools respond to this explosive growth of information?

Innovative Features

Most medical schools respond by requiring first-year students to sit through additional lecture classes, further inundating them with material and eliminating precious time for reading and analysis. Rather than overloading the curriculum, Columbia University's College of Physicians and Surgeons used a new strategy for teaching the basic sciences that deliberately reduces the volume of core material and engages students in learning through electronic means. The project's creators restructured the basic medical science curriculum into two levels of knowledge—basic and advanced. Level 1 comprises a manageable core of basic materials for learning fundamental principles, while Level 2 contains a menu of advanced readings for critical analysis.

The faculty furnish the basic principles for Level 1 through syllabi, while students explore advanced materials in Level 2 by reading textbooks and articles and responding to medical problems. The curriculum runs electronically over the local network and the Internet, together with syllabi, texts, medical photos, cell biology and histology slides, diagrams, textbooks, and articles.

For example, in the case of the red blood cell, Level 1 provides students with the major relevant mechanisms and mathematical formulas. In this basic treatment, the complexity of membrane transport is not covered—only the common transport processes regardless of body location. It is the function of the Level 2 menu topics to help students explore ion transport to each particular organ, because each has its own set of transporting structures and regulating signals.

Evaluation and Project Impact

Student advisory groups, faculty groups, and surveys of the entire first-year class were used to gauge the appropriate size of the core (1,200 pages of syllabus per year) and the ease of learning the core material on computers.

One of the assumptions underlying this curricular restructuring was the belief that defining an explicit and manageable core curriculum would increase comprehension and retention of basic principles. To evaluate its outcomes, test scores of participating students on the National Board of Medical Examiners, Part 1, were compared to those of non-participating students in previous courses.

Tests of participating students showed that, despite far fewer class hours and pages of syllabus, they consistently scored higher than students in the three years preceding the new curriculum. In the surveys, students applauded the curricular revisions and the electronic format that allowed them to review course materials and prepare for their labs at home.

While upholding the goals of Levels 1 and 2 learning, the project managed to reduce the number of lecture hours on the core by 40 percent, and the size of the course content (syllabus reading) by 400 pages. Because class hours were reduced, it was possible for students to schedule additional clinical activities.

It should be noted that, at the time of the project, the national average of student test scores increased. The higher quality of medical school applicants, therefore, may have affected the outcomes of the new curriculum. Nevertheless, even if the participating students performed at the same level as nonparticipants, they gained a comparable educational experience with far fewer class hours, syllabus materials, and, probably, lower costs.

Beyond the electronic science curriculum, the college installed e-mail and an electronic bulletin board for student-faculty communication, as well as a new 24-hour computer facility housing 25 new computer stations within the library. According to project staff, had FIPSE not funded the computerized curriculum, the new facility would not have become a reality.

Lessons Learned

The project alerted faculty to the need for a specific medical curriculum for developing critical thinking among students. However, the expectation that students would take the initiative in studying and solving the advanced medical problems intended for this purpose in Level 2 was only partially realized. Even though extra time and faculty consultation were provided for these learning activities, it became apparent that students needed more direction and had difficulty learning critical analysis on their own.

Project staff concluded that students need a well-defined curriculum for Level 2. That is, they need vocabulary and concepts in order to teach themselves how to evaluate and use the information that they reach during their electronic searching. The Level 2 curriculum is being modified accordingly.

Project Continuation

The students were so satisfied with the electronic format of the new curriculum that they lobbied the dean for additional funds to develop other courses on the network. Because students found "words" in the new curriculum less helpful than "pictures," staff are considering adding figures, flow-charts and tables to replace written portions of the syllabus.

Dissemination and Recognition

The faculty response to presentations of the new curriculum at the college has been overwhelmingly positive, as has the national response of medical organizations such as the American Physiological Society and the Basic Sciences Educational Forum, a group of science teachers from 120 U.S. medical schools.

Available Information

As part of the college's home page for the new basic medical science core curriculum, a help page with special search engines directs students to course materials and histology slides pertinent to 26 microscopy labs. This home page also links to various resources such as a glossary of terms, practice questions, and interactive images. The home page address is: http://cait.cpmc.columbia.edu:8000/

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CLEMSON UNIVERSITY
Cooperative Chemistry Laboratories

Purpose

Ask former students of introductory chemistry to describe their experiences in the laboratory and their answers are likely to include groans of remembered boredom. Hardly ever is the first encounter with Bunsen burners and pH meters recalled as an exciting initiation into experimental science.

The reason for this common attitude is that, traditionally, beginning chemistry laboratories have been attempts to illustrate principles rather than true experiments. Dependent on memorization and requiring little thought from students, these exercises succeed one another weekly throughout the semester, every technique seemingly an end in itself and with little relevance to any broader concept or purpose.

The goal of this project was to convert the general chemistry laboratory into a place where the metamorphosis from student to scientist can begin as the learner solves problems, evaluates and interprets data, and designs and carries out experiments.

Innovative Features

With help from the National Science Foundation as well as FIPSE, the project director redesigned the existing series of 12 one-period laboratory exercises into a research-oriented program where students work in groups on three laboratory projects during the course of a semester. As they carry out the projects, which include identification of an unknown compound, thermochemistry, identification of an organic unknown, analysis of a mixture, electrochemistry, and analysis of colas by spectroscopy, students learn essential laboratory techniques in addition to problem solving, collaboration, and written and oral communication.

Students are assigned to groups of four for the entire semester. The groups are as heterogeneous as possible for gender, race, and age. Each student plays a given role, e.g., leader, recorder, etc., and changes roles with each project.

The projects are open ended. With the teaching assistant's help and in cooperation with members of their group, students devise and control their own experiments. If they need to synthesize a compound, for example, they must decide on the reaction to be performed, calculate the amounts of reactants to use, and determine reaction conditions.

Each group works on a separate but related project. For example, in the role of researchers working for the Environmental Protection Agency, students are asked to identify a compound that has been found in a landfill, find out its properties and synthesize it. Each group is given a different compound, which requires students to develop a different plan of action, although the groups use the same experimental techniques.

Students learn techniques in the context of the experiments they design. SuperChemLab, a multimedia Hypercard-based program, contains audio, video and text clips illustrating laboratory techniques. If, for example, students need to learn how to perform a titration, they can access the appropriate video and text from the "techniques" screen. However, if students do not know when to perform a titration, the program leads them to instructions on when and how titrations are done by posing a series of questions.

In order for this hands-on, cooperative pedagogy to work teaching assistants had to abandon their instructor role in favor of functioning in a coaching and advising capacity. This required a major training effort, involving an initial workshop on cooperative learning—covering topics from gender speech patterns to appropriate ways of responding to students—and weekly meetings throughout the semester.

Evaluation and Project Impact

One half of the 1,300 students enrolled in beginning chemistry were randomly assigned to traditional laboratories and the other half to cooperative laboratories. Their attitudes toward chemistry and the laboratory experience were surveyed through a laboratory evaluation form, and their final examination grades in the lecture section of the course and their retention rates were compared.

The differences between the two groups' responses to the laboratory evaluation were not large. Nevertheless, students in the cooperative laboratories tended to be more positive about their experience than their peers in traditional laboratories.

Because the same lecture examination was administered to all students, it was possible to determine whether a correlation existed between performance in the lecture examination and the type of laboratory attended. The cooperative laboratories were not specifically designed to reinforce the lecture material, and they covered skills that were not stressed in the lecture course. Thus, there was a good possibility that the grades of students in the cooperative laboratories would suffer.

In the first analysis, the type of laboratory seemed to have little effect on lecture examination scores. When the scores were analyzed by gender, however, women in the cooperative laboratories outscored women in the traditional sections by an average of eight points. A two-tailed t-test indicated that this was a significant difference in the scores. A smaller rise in the scores of the male students was not statistically significant.

A similar difference appeared in retention rates. Whereas women in the cooperative laboratories dropped the course at a rate of 13 percent, the rate for women in traditional laboratories was 22 percent. Men in both kinds of laboratories dropped the course at a rate of nine percent.

Project Continuation

The cooperative laboratories have been fully integrated into the curriculum and have replaced the traditional sections.

Recognition

The project has been presented at a number of conferences and workshops as well as in journal articles. An instructor's guide and laboratory manual have been published by McGraw-Hill, and SuperChemLab, a multimedia Hypercard application for laboratory techniques and methods, is available from Falcon Software.

Available Information

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CLEMSON UNIVERSITY
Revitalization of Nonstandard Calculus

Purpose

Although the last two decades have seen numerous efforts to reform mainstream calculus, until recently nonstandard or "business" calculus—which is increasingly being required of students in the social sciences as well as business, economics and management—had been left largely untouched.

Business calculus texts, mostly watered-down versions of traditional calculus, reflected this neglect. They offered irrelevant content, failed to incorporate realistic applications, and did not require students to use technology. Although firms in business and industry need employees who can think logically, write well, use technology proficiently, and solve problems as part of a team, the available textbooks in nonstandard calculus only addressed the first of these skills.

Furthermore, the high level of algebraic manipulation demanded by these texts overwhelmed non-technical students, who often suffered from math anxiety, had poor algebra skills, and could not see how the course would help their careers. The last mathematics course these students would ever take, traditional business calculus failed to reflect the uses of mathematics in an information society, and to provide students with the applications they would need in their future work.

Innovative Features

The project originated in the wake of a FIPSE grant to introduce graphing calculators into undergraduate mathematics courses taken by science and engineering students, when faculty realized the parallel need to integrate technology into the mathematics courses for non-science majors. Soon after they began to address this problem, it became apparent that a much more fundamental transformation would be necessary to make these courses responsive to students' needs. The new project led to the complete reform of the two-semester business calculus sequence.

Project staff believed that what non-science students need is not mastery of algebraic technique, but rather conceptual understanding and the ability to interpret correctly the mathematics in real-life situations. Therefore, they focused on the relevance of key concepts to the world of change, eliminated topics that stifle the mathematical development of non-technical students, and designed courses with less lecturing and more student involvement in interpretation, mathematical decision making, and team projects. Seeking to create a classroom environment where students would be led to construct their own knowledge and to conduct their own inquiries, they encouraged dialogue between faculty and students as well as among the students themselves, and they included in the course concepts and topics of relevance to non-scientific careers. Because the business calculus sequence is taken by students majoring in fields from philosophy to animal science, along with a majority of business students, the courses featured in similar proportions business topics and topics related to other fields.

The focus of the revised courses—on rates of change and their interpretation in non-technical settings, the derivative as a rate of change, and the integral as the accumulation of change—is much narrower than that of the traditional approach. The courses feature the interplay between the discrete and the continuous, because many real-life situations involving change are discrete processes which can often be represented by continuous mathematical models allowing the application of the concepts and methods of calculus. When real-life discrete situations are represented by continuous mathematical models, the role of algebra becomes to describe, and to enable the student to reason about, the quantities that are undergoing change. This departs markedly from algebra's traditional function as a collection of organized manipulations used to obtain a numerical answer to a well-formulated problem.

Because most students are likely to work in manufacturing and marketing, the courses introduce early on linear, quadratic, cubic, exponential, and logistic models and go on to provide modeling experiences using real data. The focus, however, is not on the subtleties of modeling, but on using elementary models to obtain functional relationships between variables. Students conduct their calculus investigations on the functions represented by the models.

The new courses require the use of graphing calculators to work with real data and to develop insight through graphical and numerical representations of problem situations. Faculty use the Texas Instruments 82, but students may use the TI-82, the TI-85 or the Hewlett-Packard 48G/GX calculators.

Evaluation and Project Impact

The external evaluator examined student questionnaires, projects, journals and tests, and interviewed faculty at 13 institutions which had tested the materials. He also compared the performance of students at Clemson and at six other institutions (two groups of 273 and 247, respectively) who were taught according to the new approach.

Overall, the courses resulted in lower failure rates and improved student attitudes (85 percent of students believed they were learning as much as or more than students in traditional courses), although not in improved retention.

Because available tests concentrate primarily on procedural knowledge, they are not appropriate for assessing the range of student performance elicited by the new courses. Nevertheless, a small set of test items appropriate to both traditional and project classes was developed. The performance of students being taught by the new approach was deemed, on the whole, acceptable. The student projects and presentations, on the other hand, exhibited a large range of quality.

Lessons Learned

As part of the project, faculty and teaching assistants were trained to teach the new approach by means of summer workshops and weekly seminars. An unanticipated need for additional instruction arose as soon as the first pilot courses were carried out—the tutors whom students were accustomed to hiring to get them through the course had to be trained in the use of graphics calculators and in the reformed methodology.

Both students and faculty were sometimes hampered in the use of the new materials by their preconceptions about calculus: students who had been exposed to innovative teaching in prior courses reacted better to the reformed approach than those accustomed to traditional lecturing.

Project Continuation

Currently all 44 business calculus classes at Clemson–more than 1,500 students per semester—are being taught according to the new approach.

Dissemination and Recognition

The project has been the topic of over 150 workshops and presentations across the nation, as well as ten articles, an Internet discussion group, and a Web site. The textbook, published by D.C. Heath and Company in 1995, and the brief and complete first editions, published by Houghton Mifflin, have been or are currently being used in over 75 colleges, universities and high schools.

The project won the grand prize in the INPUT (Innovative Programs Using Technology) international competition funded by the Annenberg/CPB Project and the National Science Foundation. The competition focused on programs that take advantage of modern technology—calculators, computers, video, multimedia and telecommunications—to improve student learning in mathematics service courses. The project also received a grant to spread reform business calculus to ten institutions under FIPSE's Disseminating Proven Reforms competition.

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DIABLO VALLEY COLLEGE

A Team-Taught Interdisciplinary Approach to Physics and Calculus Education

Purpose

Even the most gifted and dedicated students in beginning physics and engineering courses usually lack the mathematical skills required to obtain the maximum benefit from these courses. This is because the design of most physics and calculus sequences makes it difficult for students to learn the mathematics they need for physics in a timely fashion.

For example, Physics I students must learn mechanics without knowing vector and multivariable calculus, an experience that the director of this project compares to carving wood with a screwdriver rather than a chisel. The next course in the physics sequence uses mathematical material—including divergence, curl, Green's Theorem, Stokes's Theorem and Gauss's Theorem—which is only taught at the end of the mathematics sequence, if at all.

To be able to cover the beginning physics syllabi, most instructors teach a bare minimum of mathematics, which must compete for space with the physics material. The mathematical deficits that students incur in these early semesters worsen as they progress to upper level physics courses. Unfortunately, many students never do.

The project sprang from the collaboration of a mathematician and a physicist who noted excessive failure rates among students in the engineering calculus and physics sequences. Even those who passed the courses encountered difficulties when they transferred to a four-year institution and many changed majors.

The project's creators wanted not only to raise the success rate in the calculus and physics sequences without decreasing content or expectations, but to increase the number of students, especially underrepresented minorities and women, who transfer to four-year institutions and complete their degrees in science and engineering.

Innovative Features

To achieve these goals, faculty integrated the curricular content of beginning calculus and physics courses and developed a unified approach to education in these disciplines. The curriculum they created, the Special Intensive Program for Scientists and Engineers (SIPSE), was purposely designed to be adaptable to a variety of institutions.

The integrated curriculum involved the re-sequencing of physics and calculus courses so that they complemented each other and consisted of two courses, each combining calculus and physics, team-taught by a mathematician and a physicist. Thus, SIPSE's first semester combined Calculus I and Introduction to Engineering Physics, a new course designed to augment the physics background of beginning students. The second semester combined Calculus III (vector calculus) and Engineering Physics I (mechanics). Calculus II was reserved for the third semester.

SIPSE's I-III-II calculus sequence placed vector calculus immediately prior to linear algebra, which made the more abstract linear algebra treatment of vectors easier to understand than the traditional sequence, where students often take linear algebra before vector calculus. The new arrangement also placed the Taylor series just before differential equations, so that students would remember the series well enough to use it in differential equations.

SIPSE also altered the sequence of calculus and physics topics within a given semester, so that the mathematics was covered before it was needed. This aided progress in physics because the student had the appropriate tools, and progress in mathematics because mathematical concepts were put into context right away. Students became familiar simultaneously with mathematical and physics notations, terminologies, and approaches.

The new arrangement allowed sufficient time to cover divergence, curl, Green's, Stokes's and Gauss's Theorems, the statistics needed for physics, and the applications of calculus to physics. The integration—as opposed to the simple juxtaposition—of calculus and physics allowed the necessary flexibility to cover calculus concepts before they were required by the physics sections of the course. For example, most of the first weeks of SIPSE's second semester were spent on vector algebra and vector calculus, with little coverage of physics material until the students had mastered vectors.

Students were required to attend cooperative study groups patterned after those in the Professional Development Program designed by Uri Treisman at the University of California, Berkeley (see *Lessons Learned* II, p. 67). The groups met for two two-hour sessions every week. They consisted of four to six students and a group leader—either an advanced SIPSE graduate or an upper-division student from Berkeley. The study groups met at one of two different times (but could have met simultaneously), under the supervision of a faculty member. The study group leader provided both individual tutoring and, most often, group instruction. The leader also served as a role model, discussing his or her experiences in more advanced coursework and in transferring to a four-year institution. Group assignments, which covered applications of mathematics to physics or subsets of homework assignments, took less than two hours to complete, leaving time for discussions and help sessions.

After SIPSE, students returned to the traditional curriculum to take Calculus II, which covers integration techniques and applications, the Taylor series and differential equations. They also took Engineering Physics II (electricity and magnetism), which uses material from the end of Calculus II, covered the previous semester. SIPSE's flexible format allowed students to transfer into it, or out of it and into the regular curriculum, at any point in their progress—a necessity given the college's student population, whose work and family responsibilities often disrupt their academic programs.

Team teaching not only allowed faculty to adjust the ratio of time spent on mathematics versus time spent on physics on a daily basis but also made it possible for the physicist to augment the mathematician's presentation with an explanation of the applications of the current topic to physics. The mathematician in turn contributed to the physicist's presentations by reviewing pertinent mathematical concepts and discussing differences in notation, terminology and style. And both instructors jointly discussed such topics as conservative vector fields or centers of mass and moments of inertia with single and multiple integration. In addition, students were able to witness discussions between faculty which arose spontaneously in or outside of class or in the study groups, and this encouraged them to become actively involved with the material.

Evaluation and Project Impact

The external evaluator's study showed that SIPSE students, although at the outset they possessed lower mathematical skills than students in the traditional sequence, had significantly higher course success (a final grade of C or above) and retention rates than their peers in the control group. Keeping in mind that students frequently withdraw because of poor grades, if more traditional students had completed the courses, the differences in success rates between the traditional and the SIPSE courses would have been even larger.

In three of the four courses tested, SIPSE students earned significantly higher grades than the controls. In the fourth course, there was no significant difference between the two groups.

Women and minorities were more likely both to persist and to succeed in SIPSE than in the traditional program. Over the course of the project, the withdrawal rate differences were especially remarkable—a mere six percent for women and minorities enrolled in SIPSE versus 24 percent for all students in the control group. A comparison of the final grades of women and minorities in SIPSE courses versus women and minorities in traditional courses shows that the SIPSE group earned significantly higher grades for all courses except beginning physics.

According to the instructors, SIPSE Physics I students performed better than the controls on common final examination questions. The scores of SIPSE students on the Wells-Swackhamer Force Concept Inventory and Mechanics Baseline tests compared favorably with those of students at Harvard and Arizona State.

Instructors also observed that SIPSE students seemed stronger than their peers in post-SIPSE lower division mathematics and physics courses, more confident in their abilities, . and more likely to transfer to a top-level four-year institution and to graduate in engineering or science. SIPSE students reported significantly more self-perceived positive changes in their study habits and in the amount of time they spent studying than their peers in traditional courses.

The project's most profound effects were on Physics I, which is not surprising because both the creation of "Introduction to Engineering Physics" and the rearrangement of the calculus sequence had been intended to prepare students to function well in this course. SIPSE's effects on performance in calculus, though significant, were not as dramatic. This too was to be expected, because students benefit more in physics from knowing the necessary mathematics than in mathematics from learning its applications to physics.

In the opinion of project faculty, SIPSE courses—with the exception of the new course, Introduction to Engineering Physics—were taught at a more rigorous level than traditional courses. And SIPSE students had significantly higher grades in Calculus III despite the fact that, unlike students in the control group, they had not taken Calculus II.

Overall, there were few failures among SIPSE students, and many of these were due to family or financial problems. Often, these students returned to SIPSE and later did well.

Lessons Learned

For successful team-teaching in SIPSE-style sequences, the physics instructor must have a strong background in mathematics. The traditional approach to physics is dictated by the students' inadequate mathematics background. But because SIPSE students do not have this deficit, the physics instructor must be prepared to use more advanced mathematical tools than those covered in the text. Although it is less important that the mathematician have a strong physics background, both faculty members must be flexible and willing to relinquish absolute control over the class.

It appears that combining Calculus III and Engineering Physics I in the second semester is essential for the success of the revised calculus sequence. Faculty allowed some non-SIPSE students who were not enrolled in Engineering Physics I to take calculus in the I-III-II sequence. The students did quite poorly.

Study groups were also crucial in the transition from Calculus I to Calculus III. In addition to instruction, they gave students support and a sense of community, something not often encountered on two-year college campuses. Frequently the groups endured beyond SIPSE into more advanced courses and sometimes even into the four-year institutions to which former SIPSE students transferred.

Because instructors team-teaching in SIPSE spent twice as much time in the classroom as they would have in an ordinary course, they received credit for two courses, plus two credits for the study group. (For every SIPSE course students received credit for a mathematics course, a physics course, and an additional unit for the study group.) Although the mathematics department was able to absorb this change in load, the much smaller physics department found it difficult to adjust, especially when several physics faculty retired and were not replaced.

Project Continuation

With the exception of Introduction to Engineering Physics, which became the prerequisite for all sections of Physics I at the college, SIPSE, despite its success, was not institutionalized. Because SIPSE classes were somewhat smaller than usual, the institution deemed the program not cost-effective, and it ended with the expiration of FIPSE funding.

Dissemination and Recognition

Project staff presented SIPSE at many meetings across the United States. In addition, the project director organized the Consortium for the Combined Instruction of Mathematics and Physics, consisting of Adirondack Community College, N.Y.; Auburn University, Ala.; Diablo Valley College, Calif.; Dutchess Community College, N.Y.; North Seattle Community College, Wash.; Rose Hulman Institute of Technology, Ind.; SUNY/Binghamton, N.Y.; and the University of Puget Sound, Wash. All these institutions, some of which have grants from FIPSE and the National Science Foundation, either have in place or are working toward a combined calculus/physics program. The consortium's mission is to disseminate findings about these programs through interdisciplinary presentations, publications, and Web pages.

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UNIVERSITY OF MEDICINE AND DENTISTRY OF NEW JERSEY-NEW JERSEY DENTAL SCHOOL

Curriculum Revision for Community-Oriented Dental Education (CODE)

Purpose

Traditional dental education aims to develop technically competent dentists to meet the needs of their patients. Acquainting students with underserved communities and their problems is not a goal of most dental curricula. Typically, after three years of coursework students spend most of their senior year developing clinical skills within the walls of the dental school. Thus, they get neither practical nor even theoretical exposure to community dentistry before graduation and have little notion of career opportunities in underserved communities. It is no wonder that new dentists are ill equipped to respond to the needs of those segments of the population who do not have access to dental care.

In recent years, national reports have called for sweeping changes in dental education, recommending that schools encourage experimentation with new and less expensive forms of education, promote active learning, emphasize community health, and use community-based providers in the training of students.

Self studies and alumni surveys at the New Jersey Dental School confirmed this advice. In response, the school developed the Statewide Network for Community Oral Health Care, which eventually grew to 11 clinics and 23 faculty. The network's clinics in turn provided the venue for CODE, the school's new community-based curriculum.

CODE aims to train dentists who can respond to the needs of the community as well as individual patients. It seeks to produce practitioners who are technically competent in all aspects of general dentistry and to do so in a more time- and cost-efficient manner than the traditional curriculum.

Through their involvement in community projects, CODE students learn to respond to community needs for affordable health care. They become adept at caring for patients as members of a multidisciplinary health team, develop practice management skills, and familiarize themselves with dental career opportunities in public service.

Innovative Features

In order to provide the substantial extramural, community-based experience that CODE demands, the fourth-year curriculum had to be thoroughly revised. A new course on community dentistry and a required community service project were added to the senior-level didactic courses, and the clinical component of the curriculum was redesigned. Because faculty wanted to involve students at all skill levels, they chose each year's group of eight to 12 CODE students from all but the bottom quintile of the senior class.

Three of the clinics in the Statewide Network for Community Oral Health Care, staffed with broadly-trained generalist faculty and supplemented by specialists from the dental school, became CODE's clinical education venues. Each clinic is managed by two faculty members, who also ensure a good mix of patients and monitor student progress. Both instructors teach, care for patients, and engage in professional development activities. Specialist faculty from the dental school make regularly-scheduled visits to the clinics.

The didactic component of the CODE curriculum consists of traditional courses on treatment planning, restorative dentistry, oral surgery, and infection control. The new course, Dentistry in the Community, explores basic concepts in public health, community dentistry, current issues in health and social policy as they apply to dental care and basic skills in the collection and interpretation of population-based data and in designing oral health promotion programs.

All students work on an organized community service project, in collaboration with service agencies near the clinics. Projects have included, among others, health promotion lectures to the elderly or to pregnant teens; oral health assessments for home-bound geriatric patients; a curriculum for Head Start children, teachers and parents, and dental services for the children; and a resource guide on family violence for dental professionals.

CODE students complete the required didactic courses and conferences at the dental school on Mondays, provide care at the clinics for three and a half days a week, and engage in community learning experiences for half a day a week. They meet with the instructor of Dentistry in the Community and with the CODE educational coordinator every two weeks to discuss their progress.

Because dental training is traditionally organized around specialized programs, New Jersey Dental School faculty wanted to ensure that the generalist faculty at the clinics would be able to teach all disciplines. Accordingly, each new instructor participated in 70 half-day training sessions with seven departments of the dental school. The sessions were designed to instruct faculty in the school's specific way of performing dental procedures and in how to implement the competency- and criteria-based grading systems used by the clinical departments. New faculty were also trained in small-group teaching, problem-based learning, and the CODE philosophy of education.

Evaluation and Project Impact

An external evaluator used faculty and student surveys and interviews, examination results, and information from the school's financial and clinical information systems. The evaluator compared matched groups of traditional students to CODE students on their performance on school competency tests, mock boards, national boards, regional licensing examinations, practice management examinations, and patient care efficiency. A comparison of student-faculty and student-staff ratios, student clinical production, patient collections, and clinic income and expenses yielded insight into CODE's cost effectiveness.

Evaluation results show that, over the course of the project, students manifested statistically significant increases in positive feelings toward community service and toward CODE. Faculty attitudes toward community-based learning and toward CODE also improved. In debriefing interviews, students reported that they felt increased confidence and that CODE made for better simulation of private practice, more faculty feedback, and closer faculty-student relations.

Based on departmental competency examinations and mock boards, all CODE students were certified to sit for the North Eastern Regional Boards (NERB), compared to 69 percent and 73 percent of their matched cohorts. There were no significant differences in performance between subjects and controls on board simulations, on the NERB examination, or on practice management mid-terms and finals.

The evaluator documented a significant difference in the clinical productivity and efficiency of CODE students. In the dental school, students are responsible for making and confirming patient appointments and financial arrangements, as well as setting up and cleaning the operatories. There is minimal chair-side assisting, and students must stand in line to obtain supplies from the dispensary. In the CODE clinics, on the other hand, the low faculty-to-student ratio and the availability of dental assistants, receptionists, and other forms of support enables students to treat about 105 patients a year, versus 41 patients treated by matched controls at the dental school. Although the clinical production of CODE students was more than 2.5 times greater than that of their traditional counterparts, because fees at the dental school are higher, CODE students averaged proportionately lower earnings than the controls.

Analysis of CODE's financial impact upon the dental school is not yet complete, but preliminary data suggest that it is possible for a program such as CODE to be revenue-neutral if the community shares in the costs and if an optimal number of operatories is available with an appropriate mix of providers (students, faculty, and staff dentists).

Lessons Learned

To overcome faculty resistance, which developed despite meetings with department chairs and monthly reports to various committees during the period of project design, staff began to implement CODE with a pilot. Ten senior students did a one-month rotation at a community clinic, came back to campus full of enthusiasm for the new approach, and were instrumental in persuading faculty of the merits of CODE.

Project staff also formed a faculty advisory committee, consisting of one representative from each department, to help to implement CODE and to formulate strategies to eliminate barriers. The committee allowed critical faculty to express their concerns and to take the lead in making the changes they believed necessary.

Project Continuation

CODE has been institutionalized and is being financed by patient revenues and by the dental school.

Dissemination and Recognition

CODE has been the subject of national meeting presentations, a newsletter, a videotape, and a number of journal articles. It received glowing reports during the accreditation site visit by the American Dental Association's Commission on Dental Accreditation. The project director received the first Stephen H. Leeper Award for his leadership of this project by the national chapter of Omicron Kappa Upsilon, the dental education equivalent of Phi Beta Kappa.

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SINTE GLESKA UNIVERSITY
Training in Culturally Appropriate Interventions for Native Americans

Purpose

General ignorance about Indian culture, the reluctance of non-Indian providers to live in the isolated regions where most reservations are found, and the scarcity of Native American human services professionals have long made effective delivery of human services to Native Americans a rarity.

The human services faculty at Sinte Gleska University—the first tribally-chartered institution in the nation to award the bachelor's degree—believed that they could train their students to provide much-needed high quality, culturally sensitive human services to Indian communities.

Innovative Features

Sinte Gleska University is located on the Rosebud Sioux reservation in South Dakota, and serves the people of the Sicangu band of the Lakota. Aware that Sinte Gleska students often lack the resources to attend graduate school, the project's creators determined to revise the human services curriculum not only to provide culturally relevant knowledge but to train B.A. students to serve as mid-level professionals. In this respect the program departs from common practice in the field, which requires a graduate degree to deliver human services.

The original curriculum was traditional in style and reflected human services programs at non-Indian institutions. The revised curriculum requires each graduate to complete 38 hours in Indian studies, including classes in Lakota language, thought and philosophy; cultural and comparative healing; tribal laws, treaties and government; and issues of dependency among Native Americans.

Project staff undertook a systematic analysis of all course materials, assessing the reading level of each text and reviewing it for culturally inappropriate or offensive concepts. For example, many abnormal psychology texts point out that most societies pass through—and move beyond—an animistic phase. Staff worked with faculty to help students understand that the present-day Lakota belief in spirits does not render the believers either primitive or foolish.

In the counseling component of the degree, after completing the necessary courses students counsel each other, and then, under faculty supervision, the public. Each student works with one to three individual clients and one or two families before graduation.

To ensure that future human services providers have resolved their own personal issues and will not attempt to do so through their clients, all students are required to undergo 45 hours of personal counseling. The counseling is provided by two Native American clinical assistants, themselves graduates of the human services program. The aim of this intervention is not to identify pathologies, but to allow students to confront constructively the forces that shape their lives. With their counselor, students scrutinize their self-concepts, personal values, interpersonal styles, attitudes toward intimacy and sexuality, communication styles and skills, life and career choices, physical health and well-being, relationship to chemicals, and any personality issues and adjustment difficulties that may exist.

Because so few materials exist to assist in the delivery of services to Native Americans, project staff decided that it was essential to norm a variety of assessment instruments on the Lakota people. This would prevent the labeling of culture-specific responses as pathological, something that often happens when assessment is based on majority-oriented instruments and interpretations.

Project staff modified a structured interview of client history, an intercultural self-perception scale, a stress questionnaire, a strategic-approach-to-coping scale, a health questionnaire, a social adjustment self-report, and a substance abuse subtle screening inventory to render them more reflective of Indian experience.

Data for norming these instruments were gathered from three Lakota reservations by human services students and some community residents. Data collectors received training which included techniques for obtaining responses from traditional, elderly, or Lakota-speaking subjects. Their efforts yielded 898 completed questionnaires, each 34 pages long. Staff consider the cooperation in producing this volume of data one of the major successes of the project.

To strengthen knowledge and understanding of the Lakota culture among human services and university students, project staff organized a series of workshops in which Lakota elders, healers and cultural experts made presentations. Students learned first-hand about historical and contemporary cultural practices, ceremonies, legends, myths and tribal history. They also helped to prepare for and attended sun dances, powwows, sweat baths, naming ceremonies, and memorials. In addition, the Rosebud Sioux Tribe and the university conducted public awareness forums on such topics as sovereignty, education, self-determination, violence, and alcohol and chemical abuse.

Finally, project staff developed a model to help human services providers relate to and alleviate the problems of cultural minorities, specifically Native Americans. The model involves learning as much as possible about the cultural group to be served, especially its historical and contemporary struggles with the dominant society; becoming familiar with the group's ways of structuring time and interpersonal relationships, learning the appropriate cultural sequences for conducting business; and being visibly involved in the betterment of the community.

Evaluation and Project Impact

The project was assessed yearly by an external evaluator and, at its conclusion, was found to have met all its goals. Employers' evaluations of human services graduates were highly positive, especially regarding cultural awareness and sensitivity. Employees rated lower in their ability to work independently and with little structure, but this may simply reflect their status as newcomers to the job.

Lessons Learned

Initially, human services students resisted the counseling component of the curriculum. The sessions interfered with their schedules, and they felt anxious about confronting personal issues. They also feared that the information disclosed during counseling might be used to keep them from graduating. The project director and the clinical assistants reassured them that the counseling would be private and subject to ethics and rules of confidentiality and would not affect their academic progress but would improve their effectiveness with clients and their own well being. The counseling eventually became so successful that students who had completed the 45 hours often requested to continue, and students from other departments asked for services.

In one community, project staff and students encountered resistance to the collection of data for the norming of assessment instruments. They were given the access they needed, however, after they presented the project at a community meeting and explained how the data would be used. The initial reluctance is not surprising given that research or data collection on reservations has historically been more oriented toward improving the researcher's career prospects than the lives of the subjects. Project staff believe that the reason the project was generally accepted was because they were well known and trusted on the reservation. It is not possible to succeed in Native American communities unless one is clearly identified with efforts to reduce human suffering and improve opportunities.

One unanticipated problem arose when students began to analyze the questionnaires. Native Americans have difficulty generating hypotheses based on questionnaire scores, viewing this as unwarranted criticism or pathologizing. Staff attempted to address this by giving human services students a course on client assessment and explaining that assessment can reveal positive as well as negative traits.

Project Continuation

The revised human services curriculum has been approved and continues to be offered. The university has employed the clinical assistants, who were originally funded with grant monies, full time.

Dissemination and Recognition

Sinte Gleska's office of student services has been reorganized to incorporate the project model for all students of the university. The business department has created a major in tribal business and enterprise modeled on the human services curriculum. Other departments have adopted the use of community healers, elders and medicine people in instruction, and a Bush Foundation grant has allocated funds for furthering this process.

Project staff have answered requests for information from a number of institutions. Salish Kootenai and Lakota community colleges in particular have consulted on ways of making the curriculum more culturally sensitive.

Staff have made presentations to the American Indian Higher Education Consortium, the National Indian Education Association, the University of North Dakota Rural Health Issues program, the South Dakota Guidance Counselors' Association, the University of South Dakota psychology department, and the National Organization of Human Services Education.

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TUFTS UNIVERSITY
Developing and Evaluating a Curriculum for Exploratory Learning in Ancient Greek Culture (Perseus)

Purpose

Perseus, a digital library on Greek culture created in 1993 at Tufts, spans the years 1200 B.C. to 323 B.C., and includes not only Greek texts but English translations, works of art, archaeological artifacts, maps, site plans, and other related materials. The originators hoped that Perseus would allow students to seek answers to sophisticated questions in the classics from authentic primary sources, while providing them with greater access, flexibility and independence in doing so.

The goal of this project was to study the impact of a second, more refined version of Perseus in six institutions as well as within the wider community of users, and to produce a set of classroom-tested curricular materials.

Innovative Features

Nine faculty members at a variety of institutions were given support to integrate the Perseus database on ancient Greek culture into their teaching. Participating colleges and universities included Holy Cross College, Rhodes College, University of Michigan, Ball State University, Wesleyan University, and Tufts University.

At these sites, Perseus was used in many different ways. For example, students used Perseus for both directed and open-ended assignments, for online exams, as a translation tool, as the basis for classics "labs," and as a library resource or supplement to a course. Perseus also proved useful as a lecture tool in classrooms, a companion to museum activities, and as part of a team-taught online telecourse.

Evaluation and Project Impact

An evaluator from a discipline other than classics, who was familiar with Perseus, was enlisted to assess the ways in which its use changed teaching and learning. He focused the evaluation not only on the particular core of materials at Tufts, but on their application in five other college settings over three years. The primary variables in his investigation were access, freedom, and collaboration. Would students work more efficiently using this tool? Would it allow them to broaden the scope of their work and collaborate with others? What difficulties does its use present for both teachers and students compared to more conventional tools?

The evaluation centered on the curriculum's assignments, activities, and methods, and their effects on students, instructors, and classics curricula. It used a combination of site visits, yearly evaluation meetings of instructors and staff, observation—both live and audio-recorded—in classrooms and laboratories, interviews with students and instructors, questionnaires completed by students, written structured reflections completed by instructors, student journals, and several content analyses of national and international uses of Perseus.

The six participating institutions used Perseus in a variety of ways. At Tufts, Perseus had long been used outside the scope of Greek language courses and general studies courses for non-majors. Ball State University used Perseus to visually investigate Greek architecture, weapons, and art, and to add iconography and visual resources in multiple courses. At Holy Cross College, students were able to pursue original assignments that, without Perseus, could only have been done by persons with years of experience. Instructors there noted that Perseus raised their expectations about the scope and quality of student work, and improved students' performance in examinations. In the University of Michigan's large undergraduate classics courses, students who were experienced and process-oriented (as opposed to their grade-oriented peers) reported finding the Perseus resource base helpful, while the other group became annoyed by the overload of information. At Rhodes College, the Perseus-based course relies on primary materials and artifacts (i.e., vase paintings, sculpture, coins and architecture) rather than on Greek texts to teach history. Perseus was fully integrated and served as the major source of historical information and course assignments. The instructor mixed traditional, content-based exams with non-traditional online administration and feedback scoring. At Wesleyan University, students put aside suggested topics relating to the course theme and, by pursuing Perseus historical and art materials, discovered unusual topics of greater interest to them and to the instructor.

The combined data from the participating institutions point to four themes in the impact of Perseus:

1. Perseus amplifies and augments teaching and learning. Perseus brought much new content to courses, not only in texts but in images and maps that were easily integrated. It allowed instructors to introduce new courses or activities by relating geographic characteristics with textual passages. More importantly, Perseus made possible new kinds of student learning (e.g., philological and visual investigations), even by students who knew no Greek.

2. Perseus requires a substantial physical infrastructure investment. At every site, hardware and network problems caused frustration for faculty and students, and laboratory staff had to be trained to support faculty and student access. These challenges are no different from those usually faced when introducing technology into instruction. Perseus worked best when used through the more familiar World Wide Web rather than the Hypercard-based version. Subsequent investigations confirm that access through the Web greatly reduces the local support required.

3. Perseus demands new conceptual infrastructures for teaching and learning. Substantial commitments of time are required from instructors—to create assignments and augment lectures with Perseus—and from students—to learn how to access materials and follow leads without being overwhelmed by the volumes of information available. Perseus also raises questions of how best to use class time and what content should be displaced when Perseus material is added to a course or curriculum. Instructors also must learn how to judge and react to electronic assignments.

4. Perseus is bringing systemic changes to the field of classics. There are several indicators that Perseus is beginning to change the way that classics is taught and studied. There are now more than 50 courses on the Perseus Web site, representing more than a dozen colleges and two dozen instructors, and illustrating the penetration of Perseus into classics curricula nationally and internationally. New faculty position announcements in classics now list computer experience as a requisite.

In addition to the evaluation at the participating institutions, Perseus questionnaires were administered in ten courses at eight college sites. Among the many variables in the questionnaire, "computer system interface" and "learning effects" produced the most suggestive results. Statistically reliable correlations imply that the type of system interface used is more strongly related to student learning than are students' previous computer experience, age, or frequency of use. The success of this technological innovation, then, depends more on the users' impression of an attractive and usable system and less on their demographic characteristics and experience levels.

A content analysis of the Perseus discussion list shows that among 271 messages from 83 individuals in 1995-96, the majority originated in the United States. This was not surprising, given that this was the first time anything like Perseus had been put on the Web, most of the topics dealt with implementation and logistical issues and the program's availability and format, as well as its implications for instruction and the future of classical studies.

The Perseus Web site took off dramatically in 1995-96. A member of the evaluation team initiated a second content analysis of the Perseus list messages. He found, for example, that over a several-week period in July and August 1996, the site transmitted 3,034,294 files—an average of 8,994 per day—from virtually every country in the world. As of March 1999, Perseus was receiving about 125,000 hits per day. This extremely high hit rate (by comparison, according to Library of Congress spokeswoman Helen Dalrymple, the Library of Congress recorded an average of 60 million hits per month in fiscal year 1998 or an average of 2 million per day) demonstrates the range and size of the Perseus community and the increasing role that electronic databases play in the humanities and instruction.

Lessons Learned

Major logistical and time barriers impeded the development and use of Perseus. The necessary computing hardware is still not widely accessible. Even when it is, some non-majors, highly conscious of time-grade tradeoffs, are reluctant to invest time learning a tool specialized to one course. To get around this, instructors at several campuses give assignments in which students are able to draw Perseus materials from the Web rather than having to learn a new tool. Only among major courses that make moderate to heavy use of Perseus does the cost in time to fully learn to use the range of services and materials in Perseus seem warranted.

A related problem is that the new technology requires instructors to make fundamental shifts in syllabus and teaching strategies. In addition, junior faculty have little incentive to devote considerable time to learning new computer techniques, when publishing their own research is more likely to impress tenure committees.

Continuation and Recognition

The entire edition of Perseus 1.0 has sold out, and a new version has been released. Popular textbooks now include Perseus companion paths; commercial encyclopedias on the Web link directly to Perseus for detailed information; and a spin-off company, Classical Technology Systems, provides training and support.

A 1998 FIPSE grant to Tufts aims to broaden the audience for scholarly documents using the World Wide Web. It allows humanists with first-rate ideas to create documents intended for the general public. Building on the Perseus database, this project will develop a new model to help change the culture of publication in the humanities.

Available Information

The many syllabi, course materials and assignments created during this three-year period as well as previous years' evaluation reports may be found at the Perseus Web site under "Teaching with Perseus." The time investments that instructors make in adopting Perseus are also described at the Web site: http://www.perseus.tufts.edu/classes/CS.96s.html. A number of articles relating to Perseus are also available.

Additional information may be obtained from:

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UNIVERSITY OF VIRGINIA
Core Knowledge Foundation: Alliance for Content-Based Materials and Pedagogy

Purpose

Academic problems in secondary and postsecondary education often have their roots in the early years of schooling. The University of Virginia's Core Knowledge Foundation, a nonprofit organization founded in 1986, seeks to prevent some of these problems by demonstrating that academic preparedness depends upon establishing strong foundations of knowledge early. The foundation aims to give students from different regions and economic backgrounds a common curricular language, and thus prevent the creation of an educational underclass.

The Alliance for Content-Based Materials and Pedagogy was a collaboration among the Core Knowledge Foundation, Trinity University (San Antonio, Texas), Hawthorne Elementary School (also in San Antonio), and five other elementary schools. The alliance focused on implementing a content-rich curriculum, collaboratively creating lessons to support it, developing a cadre of teachers as trainers, and disseminating its materials and results nationally.

Innovative Features

The *Core Knowledge Sequence*, a 100-page curricular guide, puts into place the ideas of E. D. Hirsch, Jr. as published in his works, *Cultural Literacy* and *The Schools We Need and Why We Don't Have Them*, as well as his series of books on what grade school teachers should teach and what children should know. The sequence provides a model of a coherent, content-rich core curriculum for the early grades as a planned progression of specific knowledge in history, geography, mathematics, science, language arts, and fine arts. The sequence was designed by a diverse group of teachers, parents, scientists, and experts on America's multicultural traditions.

Core Knowledge builds new knowledge on what students already know. It is presented to children early, when they are most receptive to it, adapts to a mobile society where students frequently change schools, makes up for academic deficiencies in the early grades so as not to impair later learning, and has the same academic expectations of all children.

Students using the Core Knowledge curriculum typically study subjects such as: Ancient Egypt, Greece, and Rome; the Industrial Revolution; limericks, haiku, and poetry; Rembrandt, Monet, and Michelangelo; Beethoven and Mozart; the Underground Railroad; the Trail of Tears; *Brown vs. Board of Education*; the Mexican Revolution; photosynthesis; medieval African empires; the Bill of Rights; ecosystems; women's suffrage; and the Harlem Renaissance. Specific learning outcomes accompany each section of the curriculum.

Evaluation

The evaluation of the Core Knowledge project was entrusted to researchers at Trinity University in conjunction with the Office of Research and Evaluation of the San Antonio Independent School District. The ambitious evaluation design included standardized achievement tests, attitude tests, site visits to model schools, collection of baseline performance data in model school sites, creation of school and student data profiles, content analyses of student portfolios, and measures of student attendance, suspension and discipline.

Pre- and posttest comparisons of achievement data for matched samples of students were used at model and control schools. As much as possible, the control schools were selected to be similar in size, teaching staff, physical plan, and composition of student body. Many of the standardized tests employed were already in place at each school and not specially targeted to the Core Knowledge program. This use of existing evaluative instruments enabled both analysis over time and comparison with similar schools within the same district.

Education Matters of Cambridge, Mass., was enlisted to conduct extended observations and interviews with parents, teachers, students, administrators and graduate interns.

Project Impact

Obviously, the real effects of such a curricular experiment are cumulative, as children build solid foundations of knowledge in a clear sequence, year by year. Nevertheless, 1995 evaluation data from at least five diverse model Core Knowledge schools in New York, Florida, Washington, Indiana and Texas illustrate how these schools appear to be raising the academic levels of all students, especially disadvantaged ones, and narrowing the gap between academic haves and have-nots.

Core Knowledge evaluation reports suggest dramatic gains in both quality and equity in these schools. For example, at Mohegan School, located in the innermost South Bronx and serving primarily Latino and African American students, the average improvement per pupil over a school year in the Total Language Arts Battery was more than twice the average improvement in the district. A comparable improvement in equity (i.e., children enabled to perform up to their potential) is implied by data showing that the lowest quartile of students made gains 30 percent greater than the gains made by the lowest quartile in the district as a whole. Aside from outperforming neighboring schools, Mohegan's disciplinary problems went down and attendance went up.

Similar improvement in quality and equity was demonstrated by a three-year longitudinal comparison of Three Oaks Elementary, in Fort Myers, Fla., with a control group in the same district. Although the control school began the study with higher scores, over a three-year period, Three Oaks overtook and surpassed the control school. As measured by the Total Battery of the California Test of Basic Skills, the mean at Three Oaks moved from 94 points below the national mean to a point above it. The standard deviation in students' scores narrowed from 65.77 to 33.64, indicating (as did other measures) that the lowest-performing students were being raised to the mean. Disadvantaged students made the greatest relative improvement. Pupil suspensions dropped to zero and teacher and student attendance increased simultaneously with higher scores on standardized reading tests.

In 1994, students at Ridge View Elementary in Kennewick, Wash., showed that, on the state mandated tests, they improved their reading, language, math and science scores impressively above 1993 scores. Social studies was the only area in which students' performance remained unchanged.

At Highland Heights Elementary in rural Indiana, second through fifth graders, taking either the Indiana State Proficiency Test or the California Achievement Test, steadily improved their test scores since adoption of the Core Knowledge curriculum in 1992.

Figures 1 and 2 compare 1994-1995 reading performance in grades 3-5 at Hawthorne Elementary with other schools in the San Antonio, Texas, District. Hawthorne students in the third grade performed markedly below the district average, but by the fifth grade they significantly exceeded the district average on the Texas Assessment of Academic Skills. Their successive grade-level increases showed stronger upward trends than those for other San Antonio elementary schools, confirming Hirsch's notion that Core Knowledge achievements build on themselves and that early deficiencies can be ameliorated over time.

The *Washington Post* reported in November of 1996 that test scores soared the preceding year in Calvert County, Md., after the introduction of Core Knowledge, moving the county from twelfth in the state to sixth. Calvert County is the first system in the nation to adopt Core Knowledge for the entire school district.

Results reported in 1997 from Core Knowledge schools in Colorado and Washington show students performing highly on state-mandated exams assessing abilities in independent analysis and expression. At High Peaks Focus School in Boulder, Colo., all fourth-graders tested above the proficiency standards in reading on the Colorado Student Assessment, and 78 percent scored above proficiency in writing. Their scores were the highest in the state for any public school that is not a magnet school for the gifted.

Ridge View Elementary School in Kennewick, Wash., achieved one of the highest percentages of students meeting the standard in all four areas on the Washington Assessment of Student Learning—mathematics, reading, writing and listening. The test evaluates subject matter knowledge, application of knowledge to real-world situations and analytical skills by having students read and apply information to a problem and then explain their reasoning process. Seventy percent of Ridge View students are either minorities, eligible for free or reduced-price lunch programs, or speak a second language at home.

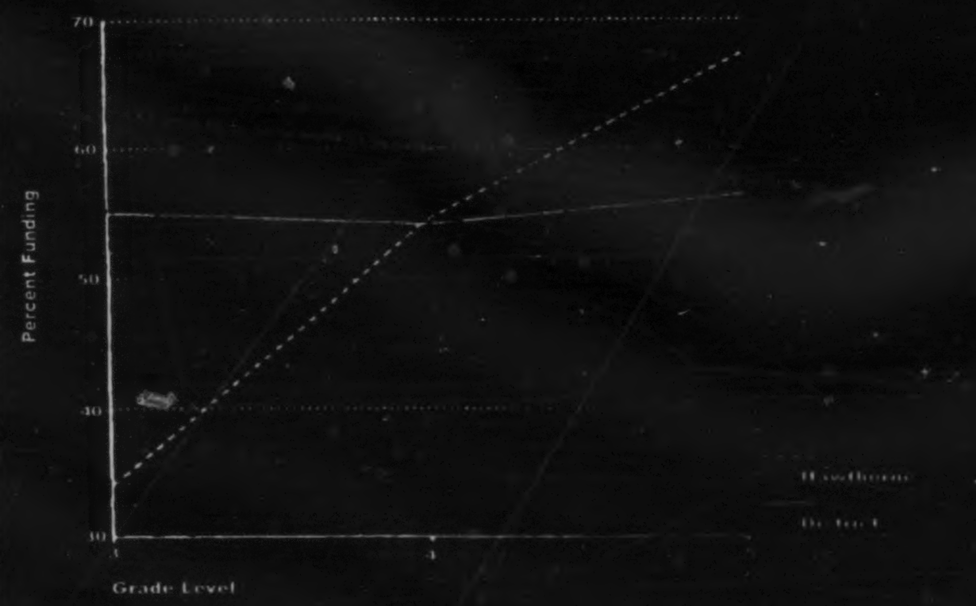

FIGURE 1 1994 Texas Assessment of Academic Skills Reading Performance

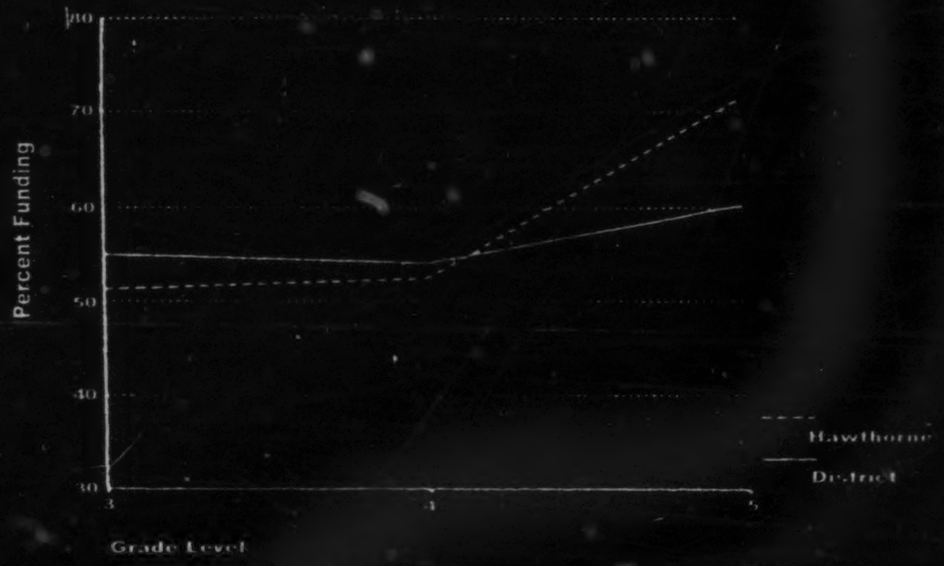

FIGURE 2. 1995 Texas Assessment of Academic Skills Reading Performance.

Project Continuation and Recognition

At last count 350 schools nationwide have adopted or are phasing in Core Knowledge programs. These schools are remarkably diverse, including urban schools in the South Bronx, rural schools in the Mississippi Delta, suburban schools in Florida and Washington, and Catholic schools, Jewish academies, and other private day schools. Core Knowledge has received widespread media attention. It has been the topic of feature stories on the major television networks, and its staff has been overwhelmed by requests for information.

The sixth National Core Knowledge Conference was held in Denver, Colo., in March 1997, featuring acclaimed children's authors, professional scholars, and visits by conference attendees to participating Core Knowledge schools.

The results of the Core Knowledge experiment show how powerful teaching and learning can be when critical content is aligned with skills instruction in the early grades. As a working model of a national curriculum, it projects a common vision for academic success by detailing explicit, year-by-year recommendations for specific content in a coherent sequence. This ladder of themes and ideas allows students to proceed grade by grade to increasingly advanced levels of understanding. It breaks through the low ceiling of expectations of which public schools are accused by providing all children with an equitable baseline of knowledge and equal access to it.

Available Information

Aside from the two books by E. D. Hirsch, Jr., mentioned earlier, one may order the *Core Knowledge Sequence* (revised 1995); *A School's Guide to Core Knowledge: Ideas for Implementation; Books to Build On: A Grade-by-Grade Resource Guide for Parents and Teachers;* Books 1-6 in the *Core Knowledge Resource Series: What Your First* [Second, etc.] *Grader Needs to Know;* and *What Your Kindergartner Needs to Know* and *Lesson Plans* (22 lessons for grades K-5 compiled at the Fourth National Core Knowledge Conference). Guidelines for seventh and eighth grades have been reviewed by teachers and field tested in schools and will be published soon.

To order any of the above, call 1-800-238-3233 or send an e-mail to: coreknow@coreknowledge.org. To join the Core Knowledge Network, Core-Net, send an e-mail to: coreknow@coreknowledge.org. The Core Knowledge Foundation has a Web page at: www.coreknowledge.org. It contains, among other things, information articles, lesson plans, discussion lists, conference announcements and agendas, job postings, and curricular resources.

For a recent evaluation of the Core Knowledge experience at one of the model schools, see Gail Owen Schubnell, "Hawthorne Elementary School: The Evaluator's Perspective," *Journal of Education for Students at Risk*, Volume 1, Number 1, 1996, pp. 34-39. For an excerpt from E. D. Hirsch's recent book, *The Schools We Need and Why We Don't Have Them*, see "Reality's Revenge: Research and Ideology," in the *American Educator*, fall 1996 issue.

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THE CITY UNIVERSITY OF NEW YORK
Preparing Doctoral Students for Careers in Urban Colleges and Universities

Purpose

Until recently, it was not uncommon for graduate students just one summer removed from undergraduate school to face their own first class of freshmen. Many did this with, at best, the benefit of a short workshop on teaching just before the beginning of the semester. Academia, which insists on more than a quarter of a lifetime's apprenticeship for research, seemed to think that, with regard to teaching, this sink-or-swim approach sufficed.

That attitude has changed, in large part in response to dissatisfaction from students, parents and legislators, and well designed schemes for helping graduate students to teach their younger peers now abound. This helps not only the undergraduates, who need the best possible instruction in their foundation years, and the graduate students, who need jobs and experience, but the universities, who have less money for faculty salaries and must therefore depend on adjuncts. For example, in the colleges of the City University of New York (CUNY) some 6,000 graduate students teach mainly remedial courses for which they bear total responsibility, including syllabus design and choice of text.

The majority of existing faculty preparation programs focus exclusively on the teaching component of academic careers and are oriented toward the needs and characteristics of a generic undergraduate population. By contrast, the purpose of this project was not only to prepare graduate students to teach but to teach urban undergraduates. Originally, the project aimed to provide instruction tailored to teaching in specific disciplines. And it wanted to give graduate students a sense not only of what teaching would be like but of what it would be like to compete for a faculty position, and then for research dollars and for tenure and promotions once the position was secured.

Innovative Features

The project offered three 15-week seminars in consecutive years—in social sciences; humanities; and science, engineering and mathematics respectively.

The seminars covered topics such as testing and grading, discipline, and classroom management. They explored the relationship between teaching, service and research. They discussed how to get and keep a teaching job. They examined the characteristics of urban learners—their demographics, language varieties, cultural diversity, academic preparation, and persistence and motivation. The seminars also examined ways to serve their students better.

In addition to a list of readings, graduate students were assigned at least one, and as many as four, structured classroom observations followed by a debriefing with the observed instructor. They developed a curriculum vitae and an introductory course syllabus, which were individually reviewed by and discussed with the project director. And they compiled information on potential funders for their research areas.

In the semester following the seminar, students participated in a practicum which consisted of monthly sessions with project staff and faculty presenters and mentors.

Coordinated by the project staff, the curricula of the seminar and the practicum were designed to accommodate a variety of presenters. In all, 50 individuals from 16 CUNY campuses and 30 departments—including faculty, administrators, and representatives of the professional union—participated in some instructional capacity.

From the beginning, the project attracted much attention from students (there were four applicants for every available seat); from faculty, who volunteered to teach and mentor and sent bibliographies and advice; and from the 17 CUNY undergraduate campuses, who hired all but two seminar participants who wanted to teach. The students who were rejected had insufficient English proficiency.

Of the total 90 participants, 88 completed the seminar and attended the monthly practicums the following semester. Only 41 elected to teach—the others were busy with jobs or research assistantships, were preparing for exams, or said they were not ready to teach. Even fewer—fifteen—elected to be mentored. Of those who chose not to be mentored, some cited time constraints, while others perceived mentoring negatively, a perception that the literature indicates is becoming prevalent among students at all levels.

The principal evaluation instrument was an "Opinion Survey" intended to measure changes in knowledge, attitude and confidence regarding college teaching. The survey was administered to all applicants before the beginning of the seminar but after acceptance decisions had been made and again at the end of the seminar. As anticipated, the posttest return rate for participants was much higher than for nonparticipants (100 percent versus 32 percent).

Another instrument, entitled "Student Survey—Looking Backward," was administered at the end of the project to students who had participated in the first two seminars (in the social sciences and humanities) to assess longer-term effects. The return rate was 89 percent. The analogous "Presenter Survey—Looking Backward" produced a return rate of 87 percent.

In addition, at the end of each session students wrote a one-minute evaluation identifying the most valuable aspect of the meeting and suggesting improvements.

Project Impact

For all groups of participants combined, the "Opinion Survey" pre- and posttest results showed a significant positive change in attitude toward college teaching. The seminars did not, however, make a statistically significant difference in knowledge about teaching. Regarding the confidence that students felt toward teaching, the scores for the participants on approximately half the items on this topic increased to a highly statistically significant degree. The scores of the comparison students, on the other hand, did not show appreciable changes in any category.

On the "Student Survey—Looking Backward," students rated as the most valuable effects of the project the range of faculty perspectives with which they came into contact, the practical tips on teaching and careers, the exchange of ideas with other students, the information about urban undergraduates (several participants became interested in teaching at institutions similar to CUNY as a result), and the "politics" of education. Students also enjoyed the interdisciplinary setting—some said that it was their first chance to interact with others outside their department since entering graduate school. Eighty-one percent of the respondents thought that the program should be mandatory for all Ph.D. candidates.

As a result of the seminar and practicum, respondents said that they were preparing more carefully for courses, allowing undergraduates to engage in more active learning, using varied teaching techniques, maintaining high expectations of students, and assigning more writing.

Respondents to the "Presenter Survey—Looking Backward" likewise saw much to praise in the program. They felt that the opportunity to address the students had helped them to clarify their own thinking about teaching-related issues, and that the project was of benefit not only to the students, but to the CUNY system as well. In fact, several Ph.D. programs, in response to reactions from students who had participated in the project, revised their teaching seminars. Two departments that had provided no formal pedagogical instruction to their Ph.D. candidates instituted teaching seminars.

Lessons Learned

In the course of readings and discussions in preparation for the seminars, project staff came to believe that a separate curriculum for the three disciplinary categories—social sciences, humanities, and science, engineering and mathematics—was essential. As they began planning the sessions, however, it became clear that only one or two of the seminar's 15 meetings needed to be devoted to discipline-specific topics such as assessing creativity or teaching remedial mathematics. Thus, the original curriculum designed for the social science seminar was adopted, with minor modifications, for the two subsequent seminars.

It was the consensus of the more than two dozen faculty from diverse disciplines who reviewed the curricula as well as of the students and presenters that a generic curriculum is not only adequate for training future faculty but helps to break down disciplinary barriers and enhances collegiality.

Given this turn of events, staff expected that the project might be succeeded upon its completion by an institution-wide seminar. Paradoxically, this was not to be. Despite evidence to the contrary, faculty, either out of territorial feelings or because they continued to believe that pedagogy is discipline-specific, insisted on anchoring teacher training in the departments.

One of the project's principal strengths, the large number of presenters—which provided a huge range of perspectives while ensuring broad faculty support—turned out to have significant disadvantages. Not only did the multitude of presenters inflate the administrative workload, but students found the inevitable discontinuities and conflicting opinions disconcerting. The format, in which a different speaker addressed each session, also provided less opportunity for in-depth discussion than a schedule in which a single speaker covered one topic during several meetings.

Project Continuation

As the project entered its second year, CUNY's Graduate School and University Center (GSUC) instituted the Graduate Teaching Fellows, a program whose goals and methods had been strongly influenced by the early FIPSE seminars and practicums.

Project Recognition

In 1993-94 and 1994-95, the project director obtained funding from CUNY to design and conduct a program addressing the special interests and concerns of women Ph.D.s in academia. In 1992, the graduate school received a grant from the American Association of Colleges and Universities and the Council of Graduate Schools, supported by the Pew Charitable Trusts, to prepare future faculty. Since then the university has granted additional funds to refine ways of integrating training for faculty careers into graduate programs. All these endeavors clearly build on the FIPSE project experience.

Available Information

Additional information may be obtained from:

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CLEVELAND STATE UNIVERSITY
Technology-Enhanced Accent Modification for International Teaching Assistants

Purpose

The technology-enhanced accent modification program (TEAM) addresses complaints from students that their learning and grades suffer because they cannot understand their international teaching assistants (ITAs). The lack of oral proficiency of many ITAs is recognized as a major problem at colleges and universities across the nation, where approximately 45,000 ITAs teach many of the 15 million students.

TEAM's creators sought to make accent modification instruction more accessible by developing reliable multimedia software that operates on low cost personal computers. The goal was not to teach ITAs to speak just like native English speakers but to help them to become intelligible to their students.

Innovative Features

On the assumption that the more ways the learner can sense a feature, the more easily he or she will learn and use it, TEAM provides multisensory computer instruction and feedback so that ITAs can see as well as hear their speech. TEAM's multimedia also enables learners to retrieve, display, and play model utterances of speech features. This is possible because recent advances in computers allow program designers to combine the visual images of a feature with audio recordings.

On the computer monitor the user sees model voiceprints showing the pitch and volume of each sound in sample phrases. Below the model, the user sees voiceprints of his or her own efforts with the same phrases. In this way, ITAs get visual input for aurally shaping their speech patterns to fit the models. The visual comparison helps them to eliminate monotonous delivery, choppy speech, inappropriate syllable stress, and the omission of certain sounds.

A criterion-referenced "Accent Survey" identifies the features of accents that need to be modified for ITAs to make themselves more easily understood. The curriculum software addresses these features, and a database contains 3,600 (1,800 male and 1,800 female) model utterances. An instructional component with online assistance helps ITAs to modify their accents' most distracting features.

The TEAM strategy differs from other approaches to accent modification in significant ways. Whereas most other pedagogies do not focus on general speech comprehensibility, TEAM addresses the prosodic (pitch, loudness, timing) features of accent as well as the pronunciation of consonants and vowels.

The curriculum software is designed to be used by pre-professional or graduate students who act as accent tutors to the ITAs, thus lowering delivery costs. Project staff train the tutors to use the design protocol and to adhere to TEAM instructional tactics. The software is designed to teach ITAs to assume responsibility for making and maintaining improvements in their accents, and it uses off-the-shelf personal computers that are widely available and affordable.

Evaluation

The software was field tested on novice computer users, and debugged to run reliably and dependably. Once a fail-proof version was created that could withstand 2,000 hours of use, testing was expanded to 128 students at Cleveland State, Kent State, and the University of Toledo.

Data were gathered on both the classroom performance of students taught by ITAs and the oral proficiency of the ITAs themselves before and at several intervals following instruction. TEAM students were compared with three groups of teaching assistants receiving other kinds of English instruction, especially the commonly used oral proficiency model.

Project Impact

The field test results were more positive than anticipated. They indicated that students enrolled in classes and laboratories with TEAM-taught ITAs as instructors performed better and obtained slightly higher grades than students enrolled in classes taught by non-TEAM ITAs.

Further, fewer students of TEAM ITAs switched to other same-time classes or laboratories. A majority of students (72 percent) in classes taught by TEAM ITAs reported that it took little or no effort to understand their instructors, compared to 49 percent of students in classes taught by non-TEAM instructors. Seventy-one percent of students taught by TEAM ITAs said that their instructors' speech did not affect their teaching performance, 92 percent described their instructors' speech as comprehensible, and 87 percent said that their own classroom performance was not affected by their instructors' speech.

TEAM-taught ITAs also performed better than non-TEAM-taught ITAs on other measures. On the "Accent Survey," they received significantly higher posttest scores on accent improvement. They took less time to make instructional improvements and, several re-tests after instruction, they retained their oral proficiency gains better than non-TEAM ITAs. (At these re-tests other ITAs regressed to pre-instruction levels of performance.) The frequency of mispronunciations was measured by the Sikorski Oral Proficiency Test. Even though the TEAM approach devoted much less time to the pronunciation features of speech than to the prosodic features, at retest it still significantly decreased ITAs pronunciation errors. However, at subsequent intervals, TEAM ITAs lost most of their pronunciation gains, compared to ITAs taught under the oral proficiency approach.

Lessons Learned

It took considerable time and cajoling to persuade institutions to retest ITAs for oral proficiency after remedial coursework was completed. The same resistance was encountered in getting English as a Second Language departments to use and follow the protocol, and several test sites had to be dropped because they would not comply. The project director concluded that, in academic settings, political and territorial factors are greater obstacles to change than technological ones.

This project demonstrates how advances in technology have allowed speech-language pathologists to work more effectively in accent modification. Extracting and displaying the acoustic properties of sound is something that technologies do accurately, quickly and reliably. An early assumption, that auditory modality alone was not enough to provide students with the clues they need to change pitch, loudness, and timing, proved true. Students can now see as well as hear their speech. They can see and hear the pitch line rise or fall. They can also see the increased loudness and duration of syllable stress and the word endings that they tend to omit. These features help them make their speech easier to understand.

The accent modification technologies turned out to be much more engaging for ITAs than drill and practice approaches. Learning and reading graphic displays of their own voiceprints and comparing them to those of the model voice actively focuses learners on their tasks and holds their attention.

In addition, TEAM turned out to be remarkably cost effective. It costs $264 to deliver instruction to a student using the TEAM approach, compared to $335 using the oral proficiency approach. When long term retention of gains in oral proficiency as well as student outcomes are factored in, the TEAM approach is approximately 50 percent less expensive.

Program Continuation and Recognition

In 1995, the project received the National Award for Excellence in Teaching English from the English Speaking Union of the United States. The judges rated the TEAM project superior in all categories of innovation, measurable effectiveness, and overall value.

In August 1997, the *New York Times* education section devoted several pages to new English language programs, highlighting the TEAM approach at Cleveland State. Consequently, the project director has opened a small company, Accent Services, USA, using TEAM software to teach non-native professionals in the community in addition to his university students.

Dissemination

Complimentary copies of the TEAM software were distributed to more than 350 colleges and universities with the largest enrollments of international students. Lawrence Erlbaum Associates, a major publisher, now markets TEAM at an educational price of $495. In addition to the field test sites, the software has been adopted for use at the University of Memphis, Michigan State University, the University of Wisconsin, and the University of Texas-Austin. Articles based on the TEAM project can be found in at least six speech-language journals, as well as in national higher education publications. In addition, project staff are participating in a FIPSE dissemination grant involving Johns Hopkins and three other universities.

Available Information

As noted earlier, the TEAM software is commercially available for higher education institutions. The project's final report to FIPSE is available on disc.

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V. GENERAL EDUCATION

CALIFORNIA STATE UNIVERSITY, LOS ANGELES
Learning English for Academic Purposes (LEAP)

Purpose

During the last several decades, almost no campus in the country has been immune to the influx of students who are less prepared for college work than faculty would like them to be. Faced with the problem of presenting college-level material to students who may have difficulty reading the text, many instructors simply give lower grades, sometimes causing the institution to lose the very students it recruited.

Other faculty may react by lowering their expectations and awarding college credit for work that belongs, at best, in high school. They are in turn accused of compromising standards and ultimately harming students by leaving them unprepared for life and work.

The discrepancy between the faculty's expectations and the students' abilities becomes acute at institutions where college-ready freshmen are the exception rather than the norm. California State University, Los Angeles, is one of these institutions: 25 percent of its students enter as "special admissions." Seventy percent of freshmen are non-native English speakers, and 82 percent place in developmental English.

Project LEAP was conceived as a partnership between faculty and supplemental instruction staff to teach academic language skills and improve performance of high risk language-minority students in general education courses. This would be achieved by integrating instruction in content and in academic literacy.

Specifically, the project sought to address the needs of international students who had studied English in their countries, recent immigrants who had been exposed to English-as-a-Second-Language (ESL) instruction in high school, and English-dominant bilingual students with poor academic literacy.

Innovative Features

The project emerged out of two decades of campus experience with study groups formed in the Supplemental Instruction (SI) model, with the distinction that whereas traditional SI includes students with varied skill levels, at California State University, Los Angeles, the groups—led by advanced, specially trained students—include only high-risk students.

During three years, Project LEAP trained faculty to improve nine existing general education courses with special techniques intended to help students to master academic English and improve their performance. The courses were supplemented by study groups with the same goals.

The courses selected for language enhancement had a history of presenting conceptual and linguistic challenges for language-minority students. Each course revision was carried out by a team consisting of a faculty member, a peer study group leader, and a language specialist experienced in using course content as a vehicle for language learning.

The teams focused on techniques for improving course lectures and making the textbook accessible. The teams taught students how to assemble information, write essays and papers, and prepare for exams. They also encouraged students to become actively involved in learning.

The team revised three courses each year. In the fall, course teams participated in a quarter-long seminar on the theory and practice of second language acquisition. In the winter, the enhanced courses and study groups were offered. In the spring, the course teams documented and evaluated their work, and the annual training manual was compiled.

During the winter term when the LEAP courses were offered, the teams met weekly, and all three teams met together at the beginning and then again at the end of the quarter. The study group leader and the language specialist attended all course lectures—a departure from traditional SI procedure, in which the SI leader attends lectures but has minimal interaction with the course instructor.

Evaluation and Project Impact

Project staff compared the final grades of 128 students in LEAP courses who participated in study groups with the grades of their 432 peers in LEAP courses who did not attend study groups. Study group participants earned an average course grade of 2.64, as opposed to 2.56 for nonparticipants. In six out of the nine LEAP courses, study group participants obtained grades equal to or higher than those of nonparticipants, and fewer Ds, Fs, and Incompletes. This is especially significant given that 55 percent of the study group participants were special admissions students, versus only 38 percent of the nonparticipants. Both groups had similar winter to fall retention rates.

Staff also compared the summary writing skills of students in study groups with those of college-ready students in regular courses. Study group participants outperformed more experienced college-ready students in a summary writing exercise.

Despite some grumbling about the length of the study group sessions, students in LEAP courses felt that the experience had been helpful, particularly in the areas of reading, writing, and note taking. They unanimously said they would recommend the Project LEAP courses to their friends.

Lessons Learned

In the course of the project, staff found that the approaches to academic English introduced for language-minority students were useful for all students who were unprepared for college, regardless of language background. Furthermore, the lecture enhancements did not impede the learning of college-ready students, but improved their classroom experience as well.

Project staff also discovered that it is important for the quality of both courses and study groups to have the members of the team—faculty, students in charge of study groups, and language specialists—become true partners. Staff identified another beneficial strategy—that of mixing international students, who typically have good study skills and high literacy but poor oral and aural English skills, and early immigrant and native bilingual students, who usually communicate well but have poor academic skills.

Instruction which integrates language and content has powerful benefits for language-minority students who lack academic literacy skills. When this responsibility is shared across the disciplines, these students can acquire necessary academic skills and build positive expectations for future academic study, even while course rigor is maintained.

Project Continuation

All the original faculty participants who are still at the university continue to teach the enhanced general education courses and have incorporated LEAP principles into their other courses. These principles have been adopted by all study groups offered at the institution, a total of 15 to 20 groups per quarter. Faculty development workshops continue to disseminate Project LEAP to additional campus faculty, with particular emphasis on new faculty and their mentors.

Dissemination and Recognition

Project LEAP faculty have presented their experiences at conferences in their own disciplines and co-presented with ESL colleagues both at the state and national levels. Several have had articles describing their course enhancements accepted for publication in such discipline-specific journals as *The History Teacher* and *Advances in Physiology Education*. Others have applied Project LEAP principles to newly identified areas of need, such as the training of graduate student laboratory instructors and the creation of instructional enhancements suitable for large lecture classes. More than 60 faculty members across the campus who teach lower- and upper-division courses in a variety of disciplines have adopted the multi-step writing assignment. And in several departments, experience and interest in teaching linguistically and culturally diverse students has become a key hiring criterion.

Hundreds of copies of the training manuals and instructional videos have been distributed to faculty across the nation. In 1994 Project LEAP received another grant from FIPSE to train faculty at California State University campuses and nationwide to integrate language and content instruction across the disciplines and continue dissemination efforts.

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THE COLLEGE OF WILLIAM AND MARY
Freshman/Sophomore Advising and Curricular Coherence

Purpose

Studies of the academic advising system at the College of William and Mary concluded with the unfortunate statistic that most students met with their advisers only once during their first two years. Consequently, students had great latitude in selecting their own courses and their choices did not correspond to the faculty's view of a coherent liberal education.

With FIPSE support, a new advising system was created to meet the need for greater intellectual coherence in undergraduates' academic programs. Its design drew on the experience of successful advising models elsewhere and on findings of the state-mandated student-outcome assessment project.

Innovative Features

The new advising system is built on faculty volunteers who each have 12 to 15 freshman advisees. At any given time, about a third of all faculty members are involved in freshman-sophomore advising. Advisers receive copious information on their advisees, compiled in part from an extensive "General Education Profile" survey conducted by the academic advising office in the summer before students enter college. The survey asks questions about students' background and experience, intellectual interests, knowledge, strengths and weaknesses in general education, academic plans, oral communication skills, and attitudes and values. Three meetings with advisers are now mandatory during the freshman year—the registrar's computers do not allow freshmen to register if they have not first met with their advisers in the two weeks preceding the registration period. Advisers have electronic access to student academic records and demographic data, and the pool of information available to advisers is constantly growing.

To satisfy the new advising expectations, faculty needed proper training. A variety of methods were used to train advisers, such as large meetings to discuss Internet access tools recently made available by the registrar and, the most helpful to faculty, focus sessions devoted to particular advising topics.

A database of curricular histories was created, comprised of six consecutive graduating classes. Findings from this database influenced advising practices in interesting ways. For example, analyses of course-taking profiles revealed that science majors took more of their general education courses later in their college careers than did humanities or social science majors. As a result, upper-division advisers in science concentrations became more involved in discussing general education issues with their advisees. Other studies showed that indecisiveness about majors and career paths was often tied to other problems, and students who showed extreme indecisiveness were referred to the Career Services Office for special attention and counseling, in the hope of adding coherence and structure to their academic planning.

Evaluation and Project Impact

Peter Ewell, a nationally recognized expert in assessment, served as the project's external evaluator in its final stages. In his report, he wrote:

> Several features of the project's design are noteworthy and helped account for the project's success. First, it strongly reasserted the original (and often lost) mentorship role of advisement by making it a significant adjunct to instruction. Rather than discharging a purely informational function in helping students to understand curricular requirements and how to act them out, advisers, in the best cases, became tutors—actively shaping student understanding of the connection between courses and their own path of development. Second, the effort was profoundly empirical. The initial student descriptive questionnaire was a particular success in building an initial profile of individual student strengths, weaknesses, and inclinations. . . while providing opportunities for students to reflect actively on what they themselves needed to do.

Further evidence of the success of the new advising system can be seen in a major shift in faculty attitudes toward freshman-sophomore advising. Before the FIPSE project, the dean's office had such trouble finding advisers that the dean levied an advising quota on reluctant departments. Today, the quota has been abandoned because faculty actually seek advising assignments. It is not uncommon for faculty planning research leaves to reserve an advising slot for the year after their return. The college's focus on advising, coupled with special recognition for outstanding advisers and the creation of small 'professional development accounts' for faculty who advise freshmen and sophomores, has led to a plentiful supply of volunteers. Faculty reviews of the advising system and the associated student database have been positive.

Student satisfaction with the new system and with their individual advisers remains high. On anonymous surveys, students reported no interest in changing their advisers. That survey finding is confirmed by the fact that the number of students who do request a change in advisers is quite small.

As expected, the number of student-adviser meetings has risen from one in two years to three in the freshman year alone, and advisers report a growing level of continuing contact with their advisees even after the students have declared a major and moved on to an adviser in their major discipline.

Concrete evidence of changes in students' course-taking patterns due to better advising is harder to provide, in part because there has been a major change in the college's general education requirements. However, studies of two graduating classes did show a marked decrease in the numbers of special appeals by seniors who found they did not have the proper array of courses for graduation. This may be ascribed to increased levels of curricular planning resulting from the new advising system.

The project's repercussions were not limited to the advising system. The most striking evidence of its wider influence is the 1993 revision of the undergraduate curriculum. The committee reports and public discussions leading up to the final adoption of the new, more structured general education requirement were shaped by the findings of the advising project. An often-repeated statistic in the curricular debates was the project's finding that, in four consecutive graduating classes, many students had taken no courses that could be construed as involving non-Western histories or cultures, that substantial numbers of students had no science experience beyond one course, and that a majority of students had no exposure to the fine and performing arts. The new general education curriculum sought to address each of these problems.

The advising project also influenced a redesign of the college's registration system. Using technology in advising freshmen in the selection of their courses eventually led to the creation of a flexible online system to allow advisers to have quick and complete access to their advisees' records.

The project's theme of curricular coherence spread beyond general education to advising within students' majors. The college provided special grants for the creation of departmental advising handbooks, which include discussion of how the major fits together and stress the intellectual themes that run through and unify courses in the major. Today almost all departments have such handbooks, some of them available on departmental home pages.

Project Continuation

The new advising system and the new Office of Academic Advising are now fully institutionalized, having firm budget support from a special allocation from the Virginia legislature. Academic Advising was protected from subsequent rounds of budget cuts and received enhanced office space. Automated procedures were put in place to ensure easy expansion and use of the curricular history and demographic database.

In addition to the firm funding base, the project enjoys broad support among faculty and administrators. In a display of that support, the college's recent strategic plan identified continuation of the advising system as a high priority for the future and endorsed the use of academic advising as a tool to build curricular coherence in students' academic studies.

Dissemination

The project's findings were presented at three mid-Atlantic regional meetings of the National Academic Advising Association, at four meetings of the Virginia Assessment Group, and at one national meeting of the American Psychological Association. In addition, members of the project team served as consultants to other universities who were planning changes in their advising systems and general education curricula and presented talks on advising and curricular renewal at AACU and CCAS meetings. Data analyses from the project were used in reports to the State Council for Higher Education in Virginia.

Available Information

The Office of Academic Advising produces a "Course Selection Guidebook" for freshmen to help them plan for their first college semester. The guidebook provides in-depth information on course selection, freshman seminars, and courses in various liberal arts and pre-professional majors.

Information about the project and its outcomes may be obtained from:

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VI. INTERNATIONAL EDUCATION

UNIVERSITY OF CONNECTICUT
EUROTECH: An International Program in Engineering

Purpose

The introduction into Latin America of a car whose name in Spanish means "it does not go" is a well-known story of one U.S. firm's failure to sell automobiles in international markets. But such spectacular failures are relatively insignificant compared to the daily, seemingly minor but cumulative effects of the inability of most U.S. professionals and businessmen and -women to understand the language and culture of their foreign partners, clients and rivals.

The University of Connecticut was ideally situated to tackle this problem. More dependent on international trade than many states, Connecticut hosts nearly 100 German companies. The demand for professionals with cross-cultural and foreign language abilities as well as overseas work experience is urgent and concrete. EuroTech was formed to answer this need by providing practical study in German, linked with academic training in engineering and industrial experience.

Innovative Features

EuroTech's five-year curriculum confers a B.S. in engineering and a B.A. in German. It offers courses for first- and second-year German that include some technical topics, one-credit modules conducted in German on engineering topics, summer internships with German firms in Connecticut, and a six-month internship in Germany.

EuroTech, which attracts approximately ten percent of beginning engineering students, grew out of well-prepared soil. In the years preceding its inception, the German curriculum had been redesigned to accommodate non-traditional majors by including special purpose language and interdisciplinary courses. The faculty were familiar with languages-across-the-curriculum, content-based instruction, and other innovative pedagogies, and some had experience with scientific German. One instructor was certified in oral proficiency testing.

In the School of Engineering, some faculty members were fluent in German and willing to raise their proficiency to a level that would allow them to lecture in special EuroTech courses. There already existed a history of cooperation between the School of Engineering and the exchange programs of Baden-Wurttemberg and the Fachhochschule Regensburg. EuroTech took advantage of this and of the availability of German-speaking engineers in Connecticut industry. Each year two German exchange students in the sciences or engineering are hired, part-time, by the EuroTech Program to assist with the courses in technical German and with composing and editing the newsletter, and to keep the EuroTech homepage up to date.

The beginning German instruction for engineering students uses the same text as the regular course. EuroTech faculty, however, add vocabulary, discussion topics, realia and exercises appropriate to engineering students. The two sections of beginning German, with about 20 students each, merge into a single section of intermediate, usually because of attrition in engineering.

In the second year, students begin taking three one-credit-hour, content-based language modules. These courses—Recitation in Applied Mechanics, Introduction to the Sciences, and Fields of Technology—are taught by language faculty assisted by a German teaching assistant, and structured around lectures by German-speaking engineers from Connecticut industry. (In Recitation in Applied Mechanics, a module adjunct to Applied Mechanics, two German-speaking professors in the School of Engineering offer the lectures.) To prepare students for these technical lectures, the speaker submits a précis of the presentation two weeks in advance. The teaching assistants acquaint themselves with the material and develop the German-English word lists that students will need to understand the lecture. The assistants then explain the material to the language instructor, who prepares simplified study materials for the students to review before the lecture. Near the end of each course, students give technical presentations on topics such as bridge engineering, the jet engine, disposal of toxic wastes, and the principles of air flight. During these presentations, they are evaluated equally for technical accuracy and linguistic competence.

Thus far two interactive computer modules have been developed for EuroTech students using hypertext software. One of these, "Ottomotor," explains the history, construction and functioning of the four-stroke engine. Another, "Hubschrauber," presents the history, principles of function and technology of the helicopter. Modules are planned for each engineering discipline.

EuroTech majors choose their upper-level language classes from regular course offerings for the German studies major. The courses have been designed so that the EuroTech students can fulfill the requirements for the language major and some of the general education requirements simultaneously.

In addition to the U.S. and German internships, EuroTech includes study trips to Germany for freshmen and sophomores, to motivate students early in their language study by introducing them to the German educational system and corporate culture. As a result, some students opt for study abroad in addition to the six-month internship.

EuroTech students are encouraged to undergo oral proficiency testing (before going on the German internship, students must test at a level of "advanced high") and two Goethe Institute examinations—the *Zertifikat Deutsch* for second-year or third-year students, and the *Mittelstufenprüfung* for those returning from the internship in Germany.

Supplemental German language instruction for engineering faculty and staff was essential to the success of EuroTech. For two years, four engineering faculty members received two hours of weekly classes, and three attended intensive language courses at the Goethe Institute in Germany.

Another important factor in EuroTech's success is the extent to which faculty seek industry's collaboration and involvement. An external advisory board composed of German and U.S. company representatives as well as individuals from government agencies meets twice a year, and provides German-speaking engineers for lecturing in courses, summer internships in the

United States, and contacts for German internships. EuroTech's budget for publicity, student scholarships, and program service activities comes from the contributions of companies represented on the board. During the early years of EuroTech the project directors met with 30 companies in Germany to develop internship contacts. The relationship with those companies is maintained through the newsletter and periodic visits.

Evaluation and Project Impact

Although beginning and intermediate EuroTech German courses are enriched with technical content, students use the same texts and take the same written, oral and aural examinations as their peers in regular courses. A comparison of performance in course examinations as well as in oral proficiency testing and in the Goethe Institute *Zertifikat prüfung* showed no statistically significant difference between EuroTech and regular students.

Compared to German majors, EuroTech students become proficient in the language later in their undergraduate careers. Language majors typically have some knowledge of German when they enter the university, whereas the typical EuroTech student does not. In addition, many German majors have spent some time in Germany when they begin their studies, and most go abroad during their third year. EuroTech students, on the other hand, usually do not go abroad until their fourth year. Once the EuroTech students return from their internships in Germany, however, their command of the language is about equal to that of the German majors. In general, students doing well in pre-engineering courses also do well in German—something that faculty believe may have less to do with particular scientific or linguistic predispositions than with general intelligence, motivation and dedication.

Students indicate that they enjoy all facets of EuroTech, but they spend a lot less time studying German than engineering—only ten percent of their time in the first year and 25-35 percent in the second year.

Attrition appears to correlate with GPAs below 2.0. Among students who indicate in the first German course that they intend to pursue EuroTech, attrition is slightly higher than among those enrolled in engineering alone. Attrition in engineering is about 50 percent. The students who are in EuroTech at the end of the sophomore year and file a plan of study as both German and engineering majors, on the other hand, have a much lower attrition rate—about ten percent.

A questionnaire designed to look into the causes of attrition revealed that students often find college overwhelming, that classes sometimes do not match students' expectations, and that many students have difficulty working methodically. Some EuroTech students leave engineering but complete a degree at the university, while others leave the program but continue in engineering. Project faculty anticipate that, as EuroTech ages, successful graduates as well as interns returning from Germany will help to keep students interested in the program.

Because it was difficult to convey complete information about EuroTech to all the advisors in the School of Engineering, an advisor was appointed and trained in each undergraduate engineering program to advise EuroTech students. Some students assumed that participation in EuroTech automatically entitled them to summer work and an internship in Germany. It is now made clear to them that these benefits depend on satisfactory performance in both the engineering and the language major.

An evaluation by a faculty member from another department took these matters into account but judged EuroTech generally sound, albeit threatened by projected budget cuts at the university. It can be concluded from data accumulated so far that EuroTech succeeds in equipping engineering students with the language skills they need to communicate about topics in their field. It is not uncommon for sixth semester German students to discuss bridge engineering or the mechanics of the jet engine or ask questions about the automatic turning rotary, the rotor head of a helicopter, or the radiation levels in forest floors of post-Chernobyl Europe.

Lessons Learned

When EuroTech students in Recitation in Applied Mechanics review the three laws of Newtonian physics in German, they are already familiar with the content of the lesson, which is also directly relevant to their professional interests. In these situations, the topic of discussion absorbs the student's attention, and the language becomes a natural vehicle for expression. It is possible for exchanges in these classes, therefore, to gain a degree of authenticity that cannot be equaled by the dialogues about generic topics found in many language texts.

The module's one-hour format, although convenient in many ways, limits the amount of material that can be covered, especially when student presentations, language laboratory sessions and discussions vie for class time. Although one hour is sufficient for lectures, preparation and revision sessions would benefit from longer periods. Because the EuroTech curriculum already demands the maximum allowable number of credit hours, it is not feasible to add credits to the modules. Project faculty are considering a flexible arrangement where some classes would last longer than others, even though this might mean sacrificing one or two class meetings during the course of the semester.

Recruiting pre-college students who can cope with the academic demands of the program now requires a considerable amount of time, although this should decrease as EuroTech becomes more widely known and recognized among the high schools. Each issue of the newsletter is sent to a broader base of potential students in the high schools, and on-campus and cable television publicity in some high schools is also planned.

Fundraising has proven more time consuming than anticipated. Efforts to raise money for servicing the program and for student scholarships have seen slow progress at first, but with the first graduates' successful job placements EuroTech is beginning to receive more contributions from employers.

Because few high schools in Connecticut teach German, EuroTech was designed assuming that students would begin the freshman year knowing no German. This has given EuroTech some much needed flexibility. Some students enter the program ready for the courses in advanced German, while others are attracted to EuroTech later in their undergraduate progress. Although course schedules have been developed in the expectation that students will begin EuroTech in the sophomore year, they can begin whenever their interest in international engineering develops. Students who enter after the sophomore year are informed of the requirements for completing EuroTech and assisted in developing an individual schedule. One student, a chemical engineer, began EuroTech in his junior year, knowing no German, and finished his requirements through study abroad at a German university, with little additional time required.

Based as it is on collaboration between liberal arts and engineering and between the university and industry, EuroTech requires a good deal of faculty time. It is important that institutions contemplating similar programs recognize these demands. The program will not survive unless the administration acknowledges the value of curricular innovation, creative pedagogy, and intensive outreach work, especially fundraising. Without this kind of recognition, and its expression through the merit and promotion system, EuroTech-style projects will fail to attract the high-caliber, committed faculty that are essential to their success.

Another critical consideration for such a program is continuity. Personnel changes, whether they be temporary, such as sabbatical leave, or permanent, disrupt progress. To maintain continuity, it is important that responsibility for the program be shared by several individuals. The minimum is two, but a greater number may be better if the necessary duties are coordinated and their successful completion rewarded.

Project Continuation

There are now 46 students in various stages of the program. So far EuroTech has five graduates—two mechanical engineers, one graduate in computer science and engineering, and two chemical engineers. All have been in great demand by prospective employers.

Dissemination and Recognition

EuroTech has received funds from the German Academic Exchange Service (DAAD) for the study trips. Yankee Ingenuity Initiative, a supporter of high tech projects to improve the skills of local labor, funded the hardware and software for the EuroTech multimedia laboratory. During its six years, EuroTech has been funded by FIPSE and by the College of Liberal Arts and Sciences and the School of Engineering. Most recently the Connecticut Department of Economic and Community Development has agreed to take over the School of Engineering portion of the funding.

Project faculty have written articles and given numerous conference presentations about EuroTech, especially at meetings related to languages-across-the-curriculum. The EuroTech newsletter and Internet home page serve to further disseminate the project.

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UNIVERSITY OF MARYLAND, COLLEGE PARK
International Negotiation Seminars

Purpose

The first two years of college are a risky time for students, especially at large research universities. There, many freshmen and sophomores wander aimlessly from one large lecture course to another, rarely able to engage intellectually either their peers or their instructors or to understand the relationship between curriculum requirements and the process of becoming educated. Bored and discouraged, too many drop out before their collegiate experience becomes meaningful.

The plight of these students motivated the creation of the International Negotiation Seminars model. This initiative was launched by the International Communication and Negotiation Simulation (ICONS) project, which has been teaching students to negotiate via multisite computer-assisted simulations since the early 1980s. On the University of Maryland campus, ICONS had previously been relegated to upper-division political science seminars, where it had been shown to greatly enhance the undergraduate experience of social science students. The seminars project brought this mode of interactive learning to lower-division undergraduates, through the creation of a new course, "Introduction to International Negotiation." Key aspects of the model were adapted to courses at other participant universities as well.

During five semesters, more than 400 University of Maryland students and 800 students elsewhere in the United States and in Europe took part in the "New Europe Simulation." In Maryland, participating institutions included the University of Maryland-College Park, and Frostburg State and Morgan State Universities. The Cooper Union in New York, James Madison University in Virginia, and Whittier College in California also took part in the simulations. The European partners included the American University of Bulgaria; Budapest University of Economic Sciences and Eotvos Lorand University, Hungary; Novosibirsk State University, Russia; Jyvaskyla Technical University, Finland; and the University of Warsaw, Poland.

Innovative Features

The new negotiation course transformed the passive, large lecture situation into a dynamic experience for fewer students. The resulting cross-disciplinary course combined lectures with small-group seminars and emphasized collaborative decision-making, cross-cultural experience, and introduction to technology via synchronous and asynchronous electronic communication with students in other universities in Europe and the United States.

The weekly discussion section, which usually complements lectures in large introductory classes, was used instead to prepare students for the "New Europe Simulation," based on scenarios focusing on ethnic, security, economic, and environmental issues. Each section of about 16 students was assigned to represent a European country, and with the help of a graduate assistant the students researched the issues, formulated policy, and negotiated with teams representing other countries. The cross-disciplinary aspects of the course were addressed by faculty guest lecturers and graduate assistants from other departments, such as economics and environmental sciences.

Evaluation and Project Impact

Project staff collected data from 185 University of Maryland students early and late during four semesters. Evaluation instruments included "concept maps" and pre- and post-questionnaires. Evaluators used concept maps on the topic of migration in Europe to learn about students' prior knowledge, and subsequent changes in and reorganization of that knowledge. The maps showed that early in the semester students concentrated on why people leave their home countries, whereas in the cognitive maps from the end of the semester attention shifted to more complex questions of reception in the host country and continuing relations with the country of origin. Late maps show heightened awareness of the interplay of domestic and foreign policy and economic and political issues at global, national, and regional levels.

Students were also asked to elaborate on questions about economic strength, European Union expansion, and environmental standards. The difference in quality of elaboration between early and late in the semester reached significance for EU expansion and environmental standards but not for economic strength. Late responses tended toward greater sophistication and revealed awareness of the interrelatedness of problems and issues. On certain factual questions, such as "Is your country a member of the EU?" correct responses went from 25.3 percent early in the semester to 88.5 percent late in the semester. Other questions were harder to code as right or wrong, but students did show more knowledge of their assigned country late in the semester.

Asked how they felt about various aspects of the course, students generally said that their knowledge of economics, politics, and the environment had increased during the semester. Regarding students' reactions to the course as a whole, on a 7-point scale the mean for "interested" ranged from 5.5 in the lowest semester to 5.8 in the highest. The mean for "challenged" ranged from 5.2 to 5.3. The mean for "identified with country" ranged from 5.1 to 5.6.

Two queries—"The course helped me to learn to think creatively" and "The instructor encouraged knowledge sharing"— matched questions on the College of Behavioral and Social Sciences course survey. The International Negotiation Seminars received ratings of, respectively, 4.0 and 4.16 on a 1-5 scale on these items, as opposed to mean ratings of 3.7 and 3.9 for all courses in the college. A 1996 evaluation of courses meeting the Distributive Studies Requirement in Behavioral and Social Sciences included a question about the course's ability to elicit active involvement in learning. On this item, International Negotiation Seminars received an average rating of 4.26 on a five-point scale, as compared to a mean of 3.37 for the other courses surveyed.

Concerning their work in country teams, students said that they were cognitively engaged, tried to make sure everyone participated, and listened to others. There appeared to be a significant correlation between high involvement in the course and self-reported learning from the policy position paper, online conferences, and e-mail exchanges.

Assessment of the innovative features of the project early-on revealed a number of weak spots. As with most active learning models, some students were prone to marginalization in the classroom. Once participant faculty were alerted to this, they responded by developing a syllabus that clearly outlined expectations—including quizzes and writing assignments—on a weekly basis. Some students were uncomfortable with the grades they received for group research and participation. Faculty addressed this problem by giving students a measure of direct responsibility in grading, through formal peer review and self-evaluation.

It also became clear that students were viewing the visits by interdisciplinary guest lecturers as less important than regular lectures. To counter this, project staff set guest faculty to work as mentors with groups of students as they did their research. Despite these efforts, however, the instructors estimated that about 20 percent of the students on each team remained less than optimally engaged.

Project Continuation

Since the grant ended, the Introduction to Negotiation course at the University of Maryland has been offered once a year. Given the absence of external funding now, faculty must rely on "volunteer" guest lecturers and can no longer hire graduate assistants from outside the department to assist with the course. However, the core experience of the course—a small-seminar within a large lecture course—continues. Students rotate between the Europe simulation and another exercise on the Americas.

Dissemination and Recognition

Subsequent to the International Negotiation Seminars Project, ICONS collaborated in the implementation of a FIPSE-funded "Negotiation Modules Project" for community college faculty and students in California. In 1997, ICONS received FIPSE funding for an initiative that is focused on Historically Black Colleges and Universities and Hispanic-Serving Institutions.

In 1994 the Negotiation Seminars project won first place in the Instructional Category of the Maryland Association for Higher Education's Distinguished Program awards. The project has been the subject of a number of articles and presentations, including some by the evaluator.

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UNIVERSITY OF MICHIGAN
The Michigan Business Assistance Corps

Purpose

The Michigan Business Assistance Corps was created to assist emerging democracies in Eastern Europe to move toward privatization and to provide masters of business administration students with an international experience. The corps arranged summer internships for the students, who served as consultants to private and public enterprises in Poland and Russia.

Innovative Features

FIPSE support began after a successful pilot which sent a group of nine interns to Poland in the summer of 1990. The program expanded and, over the course of the project, 51 consultants worked with more than 50 companies in Poland and Russia. The interns spent three months abroad, generally between the first and second years of study.

Every fall, the program was promoted among first-year MBA students. This resulted in 85 to 100 applications, consisting of a résumé and a short essay. The project director interviewed 30 to 40 applicants, and the final selection was made by the host companies in late spring.

The university's Center for Russian and Eastern European Studies provided a three-week orientation. It included "survival" Polish and an overview of Polish history, culture, politics, economics and business practices. Because few interns went to Russia, their training consisted of language lessons which students attended three times a week between notification of selection and departure and four two-hour lectures on history, culture and contemporary events.

The host companies and agencies were selected according to the quality of their proposed projects, their willingness to offer a meaningful internship, their ability to help with housing, and their fit with the applicants' interests and skills. The project director visited all companies prior to the interns' arrival.

Interns served in organizations covering areas such as aerospace, arts management, agricultural equipment, banking, computers, construction management, public health, publishing and real estate development among others. They assisted the companies in accounting, bank training, business plan development, cost analysis, economic restructuring, health information systems, joint ventures, market research, new product development, quality assurance, systems operations and strategic planning. Interns at Procter and Gamble in Poland, for example, formulated a strategy for distribution of P&G products to over 60,000 outlets in that country. Faculty from the Warsaw School of Economics and the Michigan Business School provided guidance and support.

Through donations from corporate sponsors, the Michigan Business School offered corps interns a monthly stipend of $1,500 and round-trip transportation. Polish companies provided accommodations and $250 a month for living expenses. Russian companies offered room and board.

Before leaving the United States, students contacted their host companies by fax and telephone to discuss the preliminary aspects of their assignments. During the internship, students had access to a resident assistant at the business school who provided information and data for their work.

Evaluation and Project Impact

An external agency conducted the evaluation. In addition to interviewing student participants, the agency surveyed nine host companies to assess the impact of the corps on each. Evaluators also interviewed faculty and others to judge the effect of the project on the business school.

Most students reacted positively to the internships, with those who went to Poland giving the experience higher ratings than those who went to Russia. In general, interns felt that they had gained an understanding of and respect for other cultures, a better grasp of the difficulties facing the emerging economies of Eastern Europe, and increased self-confidence.

Students believed that the internship would help them with future employment, and intended to continue the business relationships begun during their stay abroad. They all said that they would recommend the program to others, and some stated that the corps had been a major reason for applying to the University of Michigan's Business School.

Participants thought that the orientation was excellent, but would have liked more information on Eastern European business practices. Some also felt that they did not have sufficient advance information on the host company and that the company was not prepared for their arrival, but they gave the match between the company's needs and their skills and interests high ratings. They rated communication with the company as good, despite language difficulties.

Most students felt that they had made a worthwhile contribution to their company and had learned a lot both personally and professionally. They were less positive about the management of the corps, and many expressed the need for more administrative support from the program while abroad. Almost all felt that the experience had enhanced their ability to work with individuals of another culture, their knowledge of international business and their consulting skills.

In turn, most companies were enthusiastic about the interns and wanted to continue hosting corps students. After accepting interns for several years, some companies began asking for students with specific skills. Several companies offered their interns jobs upon graduation. Some companies said that they planned to have their employees attend management workshops at the University of Michigan and expressed the desire to house a business school representative at their site.

The interns were thought to have good preparation in business and consulting skills. In contrast with the favorable impressions of the training on the part of U.S. faculty and students, however, none of the host companies rated the preparation of the interns as excellent, and they considered their language skills poor or fair. The consultants' knowledge of the country's economic system and the local customs was rated as fair. Along with the interns, the host companies indicated the advisability of a longer training period.

According to the companies, the interns learned quite a bit about the country's business practices, economic system and customs during their stay, but made less progress on language. Company representatives felt strongly that, given the magnitude of the adjustment the students had to make, the internship was too short.

Since several managers of the Polish host companies were subsequently appointed or elected to senior positions in the government, the corps had some effect on public policy. After one such manager became prime minister, he invited all interns to his office to acknowledge and honor their work.

The internationalization of the University of Michigan Business School's culture constituted the major contribution of the corps, according to faculty. The corps heightened the faculty's awareness of the globalization of business and the proactive posture of U.S. business toward emerging economies. Business cases prepared by returning interns were used informally by MBA faculty, who also called on interns for their practical knowledge of business practices in Eastern European economies. The corps also made contacts between faculty and business firms and government agencies in Poland.

Business school faculty believed that, as projected by the creators of the program, the corps benefited both students and companies. While the interns helped the companies to apply the latest business concepts and practices, the Eastern European business leaders provided lessons in grass-roots entrepreneurship.

Finally, the corps helped the business school to garner support for the Davidson Institute—which features shorter internships with large firms and considerable faculty involvement—by demonstrating that interns could provide assistance to businesses in transitional economies. A number of faculty felt that the corps would lose its fundamental character if it were absorbed by the Davidson Institute.

Project Continuation

The corps was merged into the Davidson Institute, and students presently have a choice of two types of internships.

Discussions have begun about incorporating the corps experience into the business school's Office for the Study of Private Equity Finance, which conducts research, teaching and service in financial innovation and entrepreneurial activity.

Dissemination and Recognition

The success of the MBA Corps gave rise to the Domestic MBA Corps, whose function is to assist community nonprofits to perform their mission. The Domestic MBA Corps placed 23 interns in community agencies during its first two summers and plays a leading role in the implementation of an Americorps program.

A number of institutions, including the College of William and Mary, the University of Maryland, and Ohio State University are modeling international internship programs on the corps.

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SAN DIEGO STATE UNIVERSITY
The MEXUS Program

Purpose

The internationalization of business education has for the most part proceeded at a cautious and conservative pace. Originally, schools responded to the expansion of international business by offering courses in international marketing, finance, and management, all taught from a thoroughly U.S. perspective. Business students rarely traveled abroad. Eventually international study and internship opportunities began to appear in the business curriculum, but usually they were short and did not give students the in-depth training and experience they needed to do business in another culture.

Along with other FIPSE-funded projects, MEXUS is in the vanguard of innovative international study programs. As the first undergraduate transnational dual degree program in the United States and Mexico, MEXUS provides total immersion training with the aim of producing not just American businessmen and -women with knowledge of international business but truly international managers.

Innovative Features

MEXUS is a binational undergraduate international business curriculum which integrates business, foreign languages, and regional and cultural studies. Through a consortial arrangement with universities on both sides of the border, it allows Mexican and U.S. students to satisfy degree requirements for the B.A. in international business as well as the *licenciatura en negocios internacionales* simultaneously. Students from both countries live and study in Mexico and in the United States a minimum of two years each, and complete an internship at the end of the second year in the host country.

The U.S. MEXUS partners are San Diego State University (SDSU) in San Diego and Southwestern College (SWC) in Chula Vista, Calif. The Mexican partners, both located in Tijuana, are the Centro de Enseñanza Técnica y Superior (CETYS) and the Universidad Autónoma de Baja California (UABC).

The four partner institutions, located within a 15 mile radius, are members of large academic networks—SDSU is part of the 21-campus California State University system, and SWC is one of the 100 campuses of the California Community College system. Because academic requirements are articulated across campuses and course credits automatically transfer, MEXUS is easily accessible to vast numbers of U.S. students. On the Mexican side, CETYS is one of the founding institutions of the Federación de Instituciones Mexicanas de Educación Superior, a national network of prestigious private universities, and UABC is part of the university system of Baja California.

The creators of MEXUS had completed a great deal of groundwork before approaching FIPSE, garnering administrative support and drawing up preliminary agreements among the partners. After the FIPSE award, they finalized the consortium agreement, established the curriculum, recruited and selected students, and hired a coordinator, located at SDSU, to work with the four partner institutions and administer the project.

U.S. students who participate in MEXUS are overwhelmingly Hispanic—73 percent are Latino, 15 percent Anglo-Latino, and 12 percent Anglo. They demonstrate above-average academic performance, both in high school and college. Their average high school GPA is 3.6, and their class standing averages at the top eight percent of the class. The SAT average of MEXUS students is 120 points above the SDSU average. Their average college GPA is 3.4, versus an average SDSU GPA of 2.64.

Evaluation and Project Impact

During the project, MEXUS reached its enrollment goal of 120 students.

Project staff intended for all U.S. MEXUS students to take the modified CETSCALE Questionnaire, the Visual-Oral Communication Instrument, and the American Council of Teachers of Foreign Languages Oral Proficiency Interview before and after their stay in Mexico. It has, however, proved difficult to persuade returning students to take the posttests. In the case of the four students who have graduated to date, neither the cultural values nor the language proficiency posttests show significant change. This may simply be a reflection of the students' Hispanic background.

Lessons Learned

Given their experience with the project, the creators of MEXUS feel strongly that it is best to begin this kind of effort with a single partner. Multiple partners can complicate a program exponentially: in three years of FIPSE funding, MEXUS staff had to develop 11 different curricula. Every time a partner makes a change in the curriculum, the programs for new students change, and all students must be advised individually to ensure that they will be able to fulfill graduation requirements in a timely manner in both countries. This can prove overwhelming for the staff, and ultimately compromise the quality of instruction. In closely-integrated programs such as MEXUS, more is certainly not better.

Coordinating systems across such diverse institutions—public, private, two-year and four-year—proved more challenging than expected. This difficulty was compounded by differences in national, socioeconomic and academic cultures, in federal and state requirements in each country, in administrative procedures and in institutional missions. Each partner had to change many established policies to accommodate the project. The principal problems encountered at each institution exemplify the kind of stumbling blocks that projects such as MEXUS are likely to encounter.

At SWC financial aid is tied to enrollment in classes, and since the college has never had an international exchange program before MEXUS, there is no mechanism to document registration on the home campus while attending classes abroad, rendering MEXUS students ineligible for financial aid while they study in Mexico. To solve this problem, SWC students transfer to SDSU before beginning their Mexican studies and receive financial assistance from SDSU. This of course requires students to plan unusually far in advance.

In addition, while the consortium policy is that partners waive tuition for exchange students—students pay only at the home institution—this is not possible at SWC. SWC's board of regents approved in-state tuition for Mexican students, but this still meant that they had to pay two tuitions. In 1997 CETYS and UABC decided to eliminate home tuition payments for their students attending SWC.

At SDSU, when MEXUS began students studying abroad, they were eligible for financial aid for a maximum of one year only. The vice president for academic affairs successfully petitioned the Western Association of Schools and Colleges to allow SDSU to offer financial aid to MEXUS students during their second year abroad.

There was some disagreement among SDSU faculty about the appropriateness of granting two degrees—the B.A. and the *licenciatura*—for a single body of coursework. Using the European Union's SOCRATES and ERASMUS as points of reference, MEXUS staff justified the dual degree by arguing that: 1) The two degrees represent the same level of achievement, and thus should be considered "duplicate" rather than "additional." 2) The language skill demanded of MEXUS students is greater than that required for a regular degree. 3) MEXUS duplicate degrees require more credit than either the B.A. or the *licenciatura* alone. 4) Students could in theory complete the two degrees independently and without the knowledge of either institution.

UABC faculty were developing a degree in international business at the same time as they were instituting MEXUS. This taxed their academic and administrative resources and caused some of the classes that MEXUS students needed to be unavailable. These problems have since been resolved.

On the U.S. side, MEXUS has had difficulty recruiting students of non-Hispanic background, while on the Mexican side families are reluctant to let their daughters reside in the United States. Students from both countries have struggled to adjust to drastically different approaches to higher education—in Mexico, the European-style habit of placing responsibility for learning squarely on the student's shoulders, versus the structured, heavily monitored approach adopted by U.S. faculty.

Project Continuation

MEXUS has been institutionalized at all four partner institutions, and the coordinator's position at SDSU has been made full-time and permanent. The coordinator has been charged with expanding the dual degree to other disciplines and other countries. SDSU is currently finalizing curriculum and program design with institutions in France, Québec, Spain and Germany. Grant applications have been submitted to develop dual-degree international business programs in Brazil, Chile, China, Japan and Russia.

In fall 1997 the MEXUS/Women's Studies program, involving SDSU and UABC, was inaugurated. Graduates will obtain a B.A. in Women's Studies and a *licenciatura* in either *sociología, economía, or psicología.*

Project Recognition

MEXUS has been cited by Presidents Clinton and Zedillo and by the U.S. State Department as an example of United States-Mexico cooperation.

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WRIGHT STATE UNIVERSITY

Project Chile

Purpose

With one third of U.S. corporations engaging in international business, and the state of Ohio a leader in the export of manufactured goods, it was clear to the faculty at Wright State's College of Business and Administration that the preparation of their students had to change to reflect these circumstances.

Based on intensive preparation leading to an international internship, Project Chile was intended to give students technical import-export skills, fluency in Spanish, an acquaintance with Chilean culture, and professional work experience. The project's creators also wanted to benefit participating companies, in the hope of eventually increasing the economic development of Chile's Lake District or ninth region and of Miami Valley, Ohio, where WSU is located.

Innovative Features

Project Chile was developed in collaboration with the Corporación de Desarrollo y Energía—a Chilean organization that served as a link to Chile's business community—and the University Studies Abroad Consortium of which Wright State University is a member and which has a site at the Universidad Andrés Bello in Santiago.

After being accepted into the program, each student was assigned a Chilean company to research as part of two preparatory courses at Wright State—"International Trade Management" and "Chilean Culture and Commercial Spanish." Students then went to Chile, where they spent the first four months in a language immersion program at the Universidad Andrés Bello. The program culminated in a six-month international trade internship with the Chilean company that each student had researched.

Interns performed such tasks as analyzing the effects of Mercosur (a common market agreement among Argentina, Brazil, Paraguay, and Uruguay and, by the year 2000, Chile) on various Chilean industries; developing import-export manuals; participating in negotiations to establish joint ventures between Chilean and U. S., Canadian and Spanish firms; negotiating and processing letters of credit for international shipments; and analyzing the potential of overseas markets.

Evaluation and Project Impact

Although more than 100 students expressed interest in Project Chile each year, and 67 took the International Trade Management course and participated in domestic internships focusing on international trade, only eleven—three of them from other institutions—undertook the full project experience.

Language competency gains were measured by written and oral pre- and posttests. The pretest scores were higher in the written than the oral examinations, an outcome to be expected given the emphasis on written communication in college foreign language courses. After the Chilean Culture and Commercial Spanish course, students scored at the "Intermediate-mid" and "Intermediate-high" levels on the American Council on the Teaching of Foreign Languages (ACTFL) business writing examination. Upon returning from Chile, all but one scored at the "Advanced" or higher levels. Students also made significant gains in oral communication—two to four levels on the ACTFL scale, as measured by the Video Oral Communications Instrument. A full set of scores was not available for every student.

An intercultural adaptation instrument was especially designed for the project, to be used as a pre- and posttest. The instrument was filled out for every student by the director of the University Studies Abroad Consortium program and by the internship supervisor at each company. Although students achieved high intercultural scores in the pretest, indicating that they had been well prepared at their home campus, they made further gains both after the language immersion and the internship periods.

Host companies reported that the work of the interns exceeded their expectations and proved their appreciation by accepting subsequent interns.

Lessons Learned

Project Chile's paramount difficulty was in attracting students. Staff surmise that the low participation was principally due to the program's length—two years from application to completion, with one full academic year spent in Chile. And because the business school had no foreign language requirement, most students lacked the necessary language skills for the project, and had to add a full academic year and a summer of language study to their preparation time. Such a schedule clearly requires careful planning by students from the beginning of their undergraduate careers, at a time when they may not be certain of even their major, much less that they want to study abroad. It is likely that the newly created international business major, which requires over two years of foreign language, will lead to increased participation in Project Chile.

Because so few students went abroad, project staff offered to those who remained on campus the opportunity to participate in J.A. Globe, an international trade simulation. Conducted in collaboration with a Chilean university, the simulation attracted 24 U.S. and 40 Chilean students. Ten Wright State students also participated in domestic international trade internships with local companies.

There were also difficulties in collecting evaluation information. Host companies were extremely reluctant to submit written evaluations of students, fearing that students would have access to them and that negative evaluations would reflect on the companies. After staff explained the confidentiality of the process, however, the companies fully complied.

Several of the students who went to Chile failed to complete the posttests. Students are now required to sign a contract committing themselves to completing all tests or face expulsion from the program.

One of the project's original goals was to demonstrate that participants would be hired in positions requiring international trade experience and language skills. However, because most students elected to go on to graduate school, this goal could not be achieved by the end of the project. In the case of five of the students, nevertheless, Project Chile opened the doors to various opportunities related to the study of international business.

Project Continuation, Dissemination and Recognition

At the end of the FIPSE period, a grant from the National Security Education Program provided an additional two years of funding to enhance Project Chile. A modified version of the project will continue in collaboration with the University Studies Abroad Consortium and the Universidad de Concepción, Chile. The consortium offers increased publicity and a larger pool of participants, as well as the possibility of expansion to other countries. Although Wright State University will continue funding staff salaries for Project Chile, after the National Security Education Program ends programmatic moneys will have to be raised from external sources.

The project was recognized with several group and individual awards for its results.

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VII. TEACHER EDUCATION

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Learning at Many Levels: Teacher Preparation at Professional Development Schools

Purpose

In traditional teacher education programs, prospective teachers study their academic specialization in a university department, are trained in pedagogy in the school of education, and devote a semester or a quarter of their final year to student teaching. Once they begin their first teaching job, opportunities for professional development or research outside their school's in-service programs are limited.

This project sought to create professional development schools (PDS) that would prepare future teachers in the most realistic context possible and would integrate the subject-matter, pedagogical, and experiential aspects of their training. And because being a teacher should be synonymous with learning, the project's creators wanted to provide professional development opportunities for experienced teachers and to encourage research related to educational practice on the part of teachers and university faculty.

The project was carried out by the University of California, Riverside's Comprehensive Teacher Education Institute (CTEI), a collaborative partnership of the university's School of Education, selected academic departments and local schools.

Innovative Features

The project began as a pilot at a single high school. During this phase, CTEI staff developed strong collaborative relationships with the school's teachers and administrators, designed specific features of the project, experimented with various approaches, built a reputable program, and attracted interest from other schools.

Three more professional development schools were added during the years of FIPSE funding, with the assistance of an 11-member team of university and school faculty and administrators. The team reviewed applications from schools for evidence of receptivity to change and collaboration, professional cohesiveness among staff, interest in research, and commitment to teacher-driven staff development. They also evaluated applications for cross-cultural diversity, community support, and involvement in restructuring. This last item, they reasoned, would allow project personnel to complement the school's efforts, make changes quickly, and increase the likelihood of institutionalization.

The preparation of prospective teachers at professional development schools is a year-long process, which students undertake after completing the B.A. degree. During their fifth year, student teachers enroll full-time as graduate students at the university and pay regular tuition. They receive no compensation for their work at the PDS, but are eligible for financial aid and substitute teaching. The program includes 21 quarter units of field experience in the schools and 26 quarter units of courses. Some of the courses are taught at the university and some at the PDS sites, which are also wired for distance learning.

The program by necessity follows the school rather than the university calendar. In order to foster mutual support and solidarity, six to twelve student teachers are placed at each school. They attend teacher work days before classes begin, and their time at the school increases gradually to full-time in the spring. Their early induction and involvement throughout the year helps them to be accepted as faculty by both teachers and students and gives them a realistic perspective on the demands of teaching.

A university resident supervisor is assigned to each cohort of student teachers at a school. This individual, who is especially hired and evaluated by the university, may be a teacher, a faculty member, or a doctoral student. He or she works primarily at the school rather than on campus and is based in a room permanently assigned to professional development purposes. Like the student teachers, the resident supervisor follows the school rather than the university calendar, works with cooperating teachers, and has frequent contact with administrators and students.

Cooperating teachers apply to work with prospective teachers. Those selected are trained by the university supervisors and other cooperating teachers at the site. To foster consensus and commitment, the cooperating teachers and the university supervisors jointly develop guidelines about the teachers' specific roles and responsibilities.

Aided by a handbook and daily seminars, student teachers engage in intensive guided observation in a variety of classrooms and subjects for the first three weeks of the year. Then they are assigned their cooperating teachers. Although the final assignments are made by the university supervisor, both cooperating teachers and prospective teachers have a say in the decision. The latter typically work with more than one cooperating teacher.

After the initial period of observation, student teachers focus their attention on the classes for which they will eventually take full responsibility. They begin by assisting students in small groups and progress to grading work and teaching weekly lessons. In January they teach a week-long unit, and when the school's second semester begins in February they assume full responsibility for their assigned classes. This gradual transition results in an easier, less anxious experience for everyone involved.

Daily seminars—jointly planned and led by the cooperating teachers and the university supervisor—are held at each site. These seminars, some of which are interdisciplinary, vary in method and content. They break down the isolation that prevails among secondary school faculty and develop cooperation, collegiality, and a sense of community.

In addition, student teachers meet individually with cooperating teachers and with the university supervisor, thus gaining several mentors. Cooperating teachers meet together to work on issues such as assessing student teachers.

Students also take subject-specific instructional methods courses. These courses—some of which are offered at the schools—are collaboratively developed and taught by School of Education faculty, departmental faculty, and school teachers.

Unlike their peers in traditional programs, CTEI student teachers are intensely involved in self assessment. They keep reflective journals, view and evaluate tapes of themselves, develop and distribute student surveys, and compile a teaching portfolio.

During the school year, student teachers participate in all in-service programs, and they attend conferences and regional workshops with cooperating teachers. They participate in interdisciplinary team teaching, and they become certified as substitute teachers. When cooperating teachers and the university supervisor determine that they are ready, they have priority at their school for substitute teaching assignments, which they have the option to accept or decline. This arrangement allows prospective teachers to earn money, gain experience, and review their performance with the teacher for whom they substituted. The arrangement in turn benefits the school by making available substitutes who are familiar with its norms and instructional programs.

To enhance the professional development of experienced teachers, the project focuses on activities not typically available to them and strives to complement the schools' staff development programs. Participation in all activities is voluntary and open to any teachers at the partner schools.

Teachers are included in the project management team, along with school administrators and university personnel. Membership in the team, which meets bimonthly for a full day to develop and refine project activities, allows teachers to formulate policy. In addition, teachers may develop and co-teach university courses and prepare materials for student teachers, working as equals with university faculty and joining them in conference presentations about the project at local, state and national conferences.

Whereas in-service programs typically address the interests of a school's entire staff, CTEI offers teachers subject-specific seminars on such topics as state standards, methods, and curriculum. Led by a university faculty member, the seminars respond to identified interests and needs of the teachers. University personnel also help teachers to write grant proposals for pedagogical innovations, curriculum development, and summer activities.

Teachers at the partner schools receive user privileges at the University of California, Riverside, Library. In collaboration with the library, project staff train teachers in information technology and support them in its use and assist professional development schools in gaining access to the Internet. The university gives each school a high-end computer and helps it to acquire additional refurbished computers from corporate donors.

CTEI offers teachers who engage in classroom research the opportunity to consult with university faculty. In turn, professional development schools serve as research sites for School of Education faculty.

Evaluation and Project Impact

Ongoing formative evaluation assesses student teachers and this leads to program development and revision. CTEI staff use information from videos, journals, portfolios, high school student evaluations of courses and prospective teachers, classroom observations, formal questionnaires, interviews, retreats, and reunions for graduates.

During the period of FIPSE funding, external evaluators compared the experiences of CTEI student teachers with those of graduates of other southern California programs. They administered a general survey about student teaching experiences to first- and second-year teachers in 18 school districts and to student teachers in the professional development schools.

The evaluators collected information about CTEI schools through site visits, year-end surveys, and interviews of school administrators, university supervisors, and cooperating teachers. They assembled data about completion rates and professional status after graduation and administered Teaching Tasks and Efficiency Ratings questionnaires.

CTEI seems to have provided substantial benefits. CTEI students reported significantly more camaraderie and support than the teachers who had undergone traditional student teaching experiences. They felt more a part of the school and of the faculty and rated their preparation program higher than the comparison group.

During the school year, student teachers showed significant gains in their ability to perform teaching tasks as well as the usual substantial decline in commitment to teaching which accompanies the dawning of a more realistic attitude toward their profession. CTEI students felt well prepared for their duties, more involved in self assessment and closer to students than the comparison group. Because they were at the school for an entire year, project participants were able to base their lessons not only on the curriculum but also on their knowledge of the students. Overall, the evaluators concluded that CTEI student teachers had a more authentic experience than students from traditional programs and entered the profession as if they were second year teachers.

Ninety-four percent of the students graduated, and 80 percent went into teaching. In the two following years, 92 and 87 percent of CTEI graduates accepted teaching positions, compared with national rates of between 60 and 70 percent.

Preliminary results of research conducted after the end of the FIPSE grant indicate that CTEI graduates feel well prepared for teaching. They attribute their confidence to the full-year teaching experience and to working closely with many teachers. The majority of graduates from traditional programs included in the research, on the other hand, do not feel well prepared, and believe that they would have been most helped by a longer and more realistic teaching experience and more support and collaboration—the very strengths of the CTEI approach.

The evaluators found that the project did enhance the professional development of experienced teachers. Because teachers proposed many of the project's activities and chose which ones to participate in, and because teachers from different schools planned and participated in activities together, they reported a breakdown of isolation, a willingness to try new ideas in the classroom and an appreciation for the collaborative, supportive environment created by CTEI. Teachers' involvement in research further encouraged their professional growth and instructional innovation and signaled to them that research is not limited to university settings. Many teachers felt a sense of renewal in their work.

These outcomes were greatest at the sites where implementation of all components took place. Teachers at one site, which had difficulty adjusting the master schedule for all cooperating teachers, did not exhibit the same level of collegiality as the others. On the other hand, the pilot site, which was in its seventh year at the time of the evaluation, reported the highest level of support and camaraderie among teachers, possibly because these effects increase with time.

Lessons Learned

Because not all program components were implemented to the same extent at all sites, student teachers experienced uneven levels of support. It seems that certain general conditions influence the effectiveness of the CTEI experience: the desirability and location of the on-site meeting room, the extent to which the program becomes a part of the school culture, and the scheduling of the daily seminar.

In the traditional model of student teaching, in which a wide pool of candidates for cooperating teacher assignments is available, it is possible to select individuals with considerable expertise. Because programs such as CTEI confine their pool of cooperating teachers to the partner schools, it is important to select professional development school sites with particularly expert teachers and to increase the expertise of cooperating teachers at the existing sites.

Project Continuation

CTEI has become the mainstream student teaching program at the university.

Dissemination and Recognition

The project received the Quality of Education Award from the California Council on the Education of Teachers, the Exemplary Teacher Education Program Award from the National Education Association, and the 1997 Distinguished Program in Teacher Education Award from the Association of Teacher Educators, which honors teacher education programs that exemplify collaboration between local schools and institutions of higher education.

Cooperating teachers participated in grant-writing workshops and submitted proposals, individually or in collaboration with CTEI faculty, to funding agencies. Two teachers obtained grants from the MacArthur Academic Alliance, and another collaborated on a planning grant on mathematics and science teaching from the Eisenhower State Grant Program. A team of teachers and CTEI faculty obtained funding from the University of California Office of the President to research professional development for practicing teachers. CTEI also received funding from the California Department of Education.

Project staff, cooperating teachers and student teachers jointly presented the project at many local, state, and national meetings. CTEI continues to collaborate with the National Center for Innovation's Teacher Education Initiative and to consult with a variety of institutions and educators working to establish professional development schools throughout the country.

The program now includes five schools in three districts--three high schools, a middle school, and a newly-added elementary school. Because some of these are feeder schools, it will be possible to institute some innovative practices across sites. The project may expand to additional elementary and secondary schools next year.

Available Information

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PRESCOTT COLLEGE
Center for Indian Bilingual Teacher Education

Purpose

The conviction that Indian children deserve Indian teachers moved members of the Tohono O'Odham Nation to approach Prescott College to help train Native American teachers for reservation schools.

A decade ago, few Indian children were taught by members of their own ethnic group. Only 12 percent of certified teachers on Tohono O'Odham Nation were Indian. On the Hopi and Navajo reservations, the proportion of Indian teachers was 25 percent and 30 percent respectively.

This not only meant that most Indian children were taught by teachers who were not familiar with their culture and who may also have believed them to be categorically in need of remediation, but for the many children in Arizona who speak only their native languages, communicating with their teachers was difficult if not impossible. To make matters worse, non-Indian teachers usually moved out of the reservation after one to two years, taking with them the benefit of their experience and leaving their classes to adjust to a new teacher all over again. The Tohono O'Odham leaders believed that this situation was largely responsible for Native American students' dropping out of school at rates higher than those of any other ethnic group.

Innovative Features

In response to these concerns, Prescott College established the Center for Indian Bilingual Teacher Education (CIBTE), an adaptation of the college's existing Adult Degree Program. The center serves adult Indians, living on rural Indian nations, who have already accumulated some community college credits. CIBTE leads to a B.A. degree with Arizona state credentials in secondary, elementary, or special education, and endorsements in English as a Second Language (ESL) and in bilingual education. The latter means that graduates have been trained to use their native language in the classroom.

CIBTE serves students in their community, where they take tutorials or work in small cooperative peer groups with a local mentor recruited by the college. Campus activities include a weekend orientation and a liberal arts seminar. The project provides an admissions counselor to help students interact with various college offices and to interpret the college's requirements. In addition, each CIBTE student has an advisor with whom he or she establishes a personal relationship. The advisor contacts the student regularly, persisting even when the student does not return phone calls. Counselors, advisors, and project staff as a whole strive to communicate unconditional acceptance, caring and support to students.

Each student's program is individualized. Credits from other institutions are organized and applied to the degree, and students can challenge courses by assembling a life-experience portfolio documenting college-level learning. They then receive a study program carefully tailored to take into account past credits and experience and the college's requirements. At periodic intervals, staff review these programs with students and chart their progress toward the degree.

CIBTE adopts a bicultural approach to educating Native Americans. First and foremost, students are accepted and valued as they are. However, CIBTE also helps them to cultivate traits and skills for succeeding in the majority culture, such as assertiveness, individual initiative, and the ability to cope with paperwork. To encourage students to work independently CIBTE asks them to formulate a study contract for each course, meet mathematics and writing competency requirements, and write a graduation proposal synthesizing their learning.

The college cultivates relationships with local school principals and superintendents. Directors of tribal education frequently come to campus to advise project staff, who in turn regularly visit tribal education offices. An advisory committee of tribal leaders and educators ensures that CIBTE continues to respond to Indian needs.

Evaluation and Project Impact

CIBTE began in 1988 with 15 students. By 1994, 97 had graduated from the program, 21 of them with a bilingual or ESL endorsement. By 1998, the program had graduated 208 students and served representatives of 20 tribes (a small minority have been non-Indians living and working on Indian nations). All but one percent of graduates are teaching in Indian schools, whether on reservations or in rural communities near reservations.

Perhaps the project's most striking achievement has to do with retention, a major problem in Indian education. In 1988, for example, 77 percent of Native American students at the University of New Mexico dropped out, and even some tribal colleges document attrition as high as 90 percent. In this context, CIBTE's average term-to-term retention of 69 percent (rising to 75 percent in 1997) represents remarkable progress, as does the finding that ten percent of students graduating through 1996 are enrolled in or have completed M.A. programs.

Lessons Learned

When CIBTE was first conceived, its creators believed that Prescott's orientation, with its focus on the individual, its competency-based requirements and its tradition of valuing diversity would be especially compatible with Indian cultural norms. However, it soon became apparent that the self-direction needed to complete such tasks as learning contracts, to fulfill mathematics and writing competency requirements, and to write a graduation proposal placed overwhelming pressures on some students, who were accustomed to the Native American focus on community. Nevertheless, staff discovered that these students can develop individual initiative given the right kind of support. This means that staff frequently visit them at home, talk through their assignments step by step, and give them encouragement. The students who do best are those who find a compatible peer cooperation group or a particularly caring mentor.

Tribal politics had a major impact on the project. CIBTE staff had to contend with changes of administration in the tribes, shifting requirements by tribal financial aid offices, and evolving views of what constitutes appropriate higher education for Indians. College personnel found that gaining the trust and respect of tribal leaders took time, but the process was helped along by interactions with the president and dean, and eventually by the results of the project itself, especially the successful placement of graduates in reservation schools.

From 1990 to 1992 CIBTE had an Indian director. The reaction to his departure was reflected in a temporary increase in attrition. In hindsight, it appears that the college could have benefited from an increased awareness of Native American mores, while the Indian staff in turn needed greater familiarity with the ways of a primarily white institution.

Given the financially precarious circumstances of most CIBTE students, it is not surprising that enrollment follows the availability of tuition monies, and this in turn has affected tribal representation in the project. When Title VII scholarships, which brought in students from a number of tribes, ended, the college began working with the Navajo Nation to negotiate financial aid. Navajo representation among students then grew to 70 percent. The college is currently attempting to increase diversity in tribal enrollment.

Project Continuation

The project has been institutionalized, partly with the aid of other grant funds. It is administered by a program dean, two full-time faculty (Navajo and Apache), an admissions counselor, an assistant to the dean for operations, and an administrative assistant in CIBTE's newly established sub-office in Window Rock, Ariz., on the Navajo Nation.

CIBTE has grown to include post baccalaureate students seeking teacher certification, and students working toward B.A. degrees in teacher education, and counseling psychology and human services.

In 1993 Prescott inaugurated "Culture, Environment and Education," a six-month curriculum for Latino and Indian teacher education students in southern Arizona. The curriculum combines teaching methodology and environmental education—with a focus on local environmental issues—and has attracted a number of CIBTE students.

In 1997, CIBTE became part of Prescott's Adult Degree Programs (ADP). Due to administrative changes and lack of funds, enrollment declined from a high of 157 Indian enrollments in 1995 to an average of 108 from 1996 through 1998. Approximately 70 percent of the students are Navajo.

The Tohono O'Odham Nation currently supports scholarships for a four-year bachelor of arts program. This unique program allows students without prior college credits to complete a four-year degree and meet the community's needs. As of February 1999, the ADP Tohono O'Odham Psychological Services (TOPS) program graduated five students (one student dropped out).

Dissemination and Recognition

With funding from the Arizona Humanities Council, CIBTE organized a statewide conference entitled "Native American Voices: Culture and Learning." The gathering, which attracted 250 participants, featured Indian educators who presented traditional ways of learning.

In addition to FIPSE funding, between 1989 and 1995 CIBTE received support for scholarships and operations totaling $1,310,800. Contributors included Title VII, the Hearst Foundation, the Education Foundation of America, the Navajo Ford Consortium, Navajo Title V, the Ittleson Foundation, the Stocker Foundation, the Rockefeller Brothers Fund, and the Environmental Education and Training Foundation.

Available Information

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VANDERBILT UNIVERSITY
Improving Undergraduate Teacher Education with Technology and Case-Based Instruction

Purpose

The courses that future teachers take in college do not always prepare them for the realities of the classroom. Faculty at Vanderbilt's Peabody College noticed that students left reading courses with information about the factors affecting reading and knowing how to evaluate different instructional models, yet they seemed inflexible in their thinking about the problems encountered in teaching. They also appeared limited in their application of intervention techniques to new contexts. Their repertoire of alternative techniques to use when instruction did not go as expected appeared small.

Teaching is a complex cognitive skill. Because it occurs in ill-defined environments, it requires not only knowledge about what to do but the ability to determine when and how to do it. Methods courses often fail to help prospective teachers because they teach procedures and neglect problem-solving skills. Lecture methodologies and written or videotaped case studies that oversimplify complex problems are especially ineffective.

Lectures do not work because they do not teach students to analyze the effects of situational and classroom contexts on a teacher's choice and application of method, since it is impossible to describe all the nuances and dynamics of classroom interactions. Because of the linear nature of lectures, examples used to explain concepts can seem unrelated to each other and students have to struggle to make sense of disparate experiences.

Nor is all case-based instruction successful. In written case studies, often problems are too narrowly described to show how multiple factors interact to create problems. Videotaped cases are of necessity fragmented and do not allow for comparisons across cases. Because videotape only allows the instructor to run through an entire segment once rather than reviewing specific scenes as often as needed, videotaped cases do not provide opportunities for exploration and problem identification at the level required by case-based pedagogy.

For a number of reasons outlined below, project faculty concluded that a videodisc-based problem solving approach would help students to develop flexible thinking about problems and the spontaneous use of strategies to solve them.

Innovative Features

During the course of the project, faculty developed, tested and disseminated 16 videodisc-based cases enhanced by Hypercard and microcomputer technology, to be used in developmental and reading methods courses. They adapted the case-based procedures used in medicine, law and business, which have found case-based instruction useful in problem-solving and preparing students to know and act simultaneously. The resulting discs portray several units of instruction and present teacher and student interviews, numerous classroom scenes, procedural activities, and learning among various groups.

Faculty chose reading education courses for videodisc enhancement because they are vital to the national interest. They believed that reading education courses, which all undergraduate teacher education students are required to take, are especially suited to problem-centered instruction developed around case studies. To counteract fragmented learning they developed cases to teach across both developmental and remedial reading.

They chose videodiscs because these discs allow rapid random access and frame-accurate searches and freeze-frame and menu-driven control for cross-referencing of information across cases. In addition, it is possible through computer links to incorporate additional perspectives using text, sound and graphics. Videodiscs provide such information as teachers' nonverbal cues and simultaneously-occurring classroom events, which students can reexamine and cross-examine from multiple perspectives. Being able to see the events that lead to teachers' decisions allows the transfer of knowledge to real-world situations. In short, videodiscs, especially when linked to computers, encompass all the possibilities of print and videotape while avoiding their shortcomings.

To complement the videodiscs, project faculty created supporting Hypercard technology, lesson plans, and other materials. Hypercard technology enhances the effectiveness of instruction by providing students access to multiple sources of information about each case.

Evaluation and Project Impact

In the course of the project, faculty used pretest and posttest control groups to evaluate students' perception of changes in knowledge and the usefulness of various methods of instruction. They evaluated two sections of developmental and remedial reading methods courses, one taught with videodisc, case-based instruction and one with traditional instruction, including lectures with readings, written cases, and demonstration videotapes. They also compiled case studies of students who were taught with the videodisc methodology. The evaluations comprised many measures, from paper and pencil tasks to structured interviews.

Faculty measured the effects of the videodisc methodology on students' participation in case analyses in the college classroom, their knowledge of factors contributing to literacy development, their knowledge and application of instructional procedures in the school classroom, and their use of decision-making strategies when confronted with problems during teaching.

Preliminary data indicate that student knowledge increased during the course and that students changed their perception of the value of certain teaching methods, i.e., more felt that class discussions and field experiences were valuable ways of learning and that problem-solving abilities were enhanced by the use of video.

In the classes that used videodiscs there was abundant discussion, with students showing more factual knowledge and ability to analyze problems from multiple perspectives and to use information to solve new problems. These students asked more questions and made more comments, and their questions showed their ability to evaluate and synthesize the material. They showed an increased ability to consider alternative solutions to problems, to adjust appropriately instructional routines and procedures, and to justify decisions.

Faculty observed that students entered the course with a limited understanding of the complexities of reading instruction, focusing on narrow aspects of reading development to guide their analysis of the initial video case. Eventually, they improved in their ability to adopt additional perspectives for thinking about classroom situations, something which, according to researchers, does not normally happen until after students begin teaching.

To compensate for the small size of the original evaluation sample, the effectiveness of the videodiscs was tested at other institutions, where data were gathered with surveys and structured interviews. These follow-up tests revealed similar results: students participated more in class discussions; students adopted new perspectives to analyze teaching dilemmas; and students increased their abilities to identify problems and offer solutions.

Project Continuation

At Vanderbilt, the cases are used every semester in several sections of developmental and remedial classes. They are also used on a continuous basis in at least six other sites.

Dissemination and Recognition

The project was the subject of eight articles (one of which received the Distinguished Research in Teacher Education Award from the Association of Teacher Educators), eight technical reports, and 25 presentations. It was visited by faculty from the United States and abroad.

The videodisc material has been converted to CD-ROM and published as Risko, V. J., & Kinzer, C. K., *Multimedia Cases in Reading Education* (McGraw-Hill, 1999).

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VIII. PERFORMANCE FUNDING AND REPORTING IN COLLEGES AND UNIVERSITIES

INTRODUCTION TO PERFORMANCE FUNDING

Robert B. Stein
Missouri Coordinating Board of Education

Funding performance is not a new concept for academicians, as any faculty member who has engaged in discussions of merit pay will testify. Funding linked to group rather than to individual performance is, however, a relatively recent phenomenon that has drawn the attention of policy makers, legislators, and governors as states seek new ways to make educational policy.

While performance funding initiatives vary in shape, size, and scope, they all involve rewards for outcomes. Performance funding is based on the assumption that previously established priorities will drive funding policies and that, by rewarding results, individuals, groups, or entire institutions will be motivated to produce desired changes within the system.

Burke and Serban (1997) report increased state interest in using some form of performance funding as a strategy for improving the quality and accountability of higher education systems. The design and implementation of performance funding programs that highlight teaching and learning issues have become major challenges as states seek to balance legislative interest in productivity and efficiency measures with an emphasis on quality of student outcomes.

Missouri's Funding for Results initiative supports enhanced quality and accountability in the state's public higher education system. With support from FIPSE, a unique performance funding program is evolving in Missouri. While its use in other states will require adaptation, the lessons learned in Missouri will be helpful to institutions and states intending to use performance funding as an innovative strategy to bring about improvements in teaching and learning.

Burke, J.C. and Serban, A.M. (1997). *Performance Funding and Budgeting for Public Higher Education: Current Status and Future Prospects*. Albany, N.Y.: Rockefeller Institute of Government.

MISSOURI COORDINATING BOARD FOR HIGHER EDUCATION
Funding for Results

Purpose

While a commitment to quality teaching and learning is included in the rhetoric of most state-level policymakers, state appropriations for higher education have historically been driven by more easily measurable factors, such as inflation or credit hours generated. As a result, value is placed on growth at the expense of continuous quality improvement. Innovations in teaching and learning are often left to individual faculty initiatives rather than included in budgets. Missouri chose to confront this imbalance by redesigning its funding policies to emphasize results in specific areas with quantifiable goals.

Based on previous planning priorities, Funding for Results (FFR) recognizes institutions for their achievement of quality goals and for their design and implementation of faculty-driven teaching and learning improvement projects. As a statewide initiative, FFR is currently working with 18 public two-year campuses and 13 public four-year campuses. Collectively, there is a potential to eventually affect 8,083 full-time equivalent (FTE) faculty and 131,240 FTE students. Through a collaborative approach, Missouri has started a process that engages faculty, administrators, legislators, and business leaders in a new partnership emphasizing results.

Innovative Features

Missouri's approach to performance funding includes several innovative features designed to break down barriers, overcome resistance, and infuse new understanding, interest, and excitement in the business of quality improvement.

In Missouri, budget requests are designed so that each institution has a core budget that is carried forward each year; new dollars which support major public policy initiatives are requested in addition to the core budget. The FFR dollars earned by an institution in a given year are placed in that institution's core budget and thereby are retained in succeeding years. In this way, although the total amount of money appropriated in any given year is relatively small, i.e., less than two percent of an institution's total budget, its impact is magnified.

Too often a heavy hand from a legislature or a central administration causes a state to design agendas linked to budget policies. For example, headcount formulas may be used to reward institutions for increased numbers of students who meet specific standards, or a particular assessment instrument may be mandated to evaluate student performance regardless of the type of institution involved. These approaches often pit one state institution against another, thus reinforcing undesirable competition for scarce resources and causing fragmentation of the higher education system. In response, faculty and administrators perceive unfair treatment and claim that differences in mission, e.g., clientele served and programmatic mix, have not been acknowledged.

FFR seeks to acknowledge institutional differences and to allow flexibility in the specification of measures while motivating institutions to work toward common state goals. A major component of FFR involves the design and implementation of campus teaching and learning improvement projects at each of Missouri's public colleges and universities. These projects require new partnerships between faculty and administration in the use of performance funding incentives provided by the state. Broad-based parameters, such as use of a database indicator system, extensive faculty ownership, systematic evaluation, and incentive systems, were established for eligibility to participate in this program. Institutions are, however, given great flexibility in the design of particular projects, which range from improving the basic skills of entering students to enhancing the residency experiences of doctoral students.

FFR acknowledges differences in institutional mission while rewarding each institution for its contribution to meeting a state need. Institutions are also being encouraged to become more distinctive. In each case, performance measures are identified so that achievement of institutional mission can be demonstrated and rewarded in the context of a unified plan for public higher education in the state.

Because FFR is using data with common definitions, the state is well positioned to provide annual reports that compare institutions on statewide goals, e.g., six-year graduation rates, as well as to describe some unique contributions from each institution concerning teaching and learning improvements.

The faculty is generally perceived to have primary allegiance to disciplines and departments rather than institutions. While faculty have common interests and concerns regarding student learning, their voices are too often heard only in reaction to, rather than during the creation of, statewide policies. Involving faculty in discussions with state-level policymakers requires the design of new expectations that circumvent traditional hierarchical structures and foster direct lines of communication. In response to these challenges, Missouri chose to create an FFR Committee on Teaching and Learning which consists of faculty only. This group has the major responsibility for providing reactions to state policymakers on FFR and its effect on teaching and learning.

Traditional reward structures associated with teaching and learning improvements are often designed for individuals, e.g., merit pay systems and faculty awards. These approaches to performance funding, as conceived by FFR, are narrow and restrictive. Instead, FFR promotes rewards to departments, colleges, deans' offices, and the campus as a whole by working with the institution to redesign its approach to the flow of money. Rewards for teaching and learning improvements are slowly becoming integrated into the campus culture, as institutions are encouraged to set goals, establish appropriate units of analyses, and then, once goals have been met, to release rewards. As a part of FFR, a competition for the "Best of the Best" campus teaching and learning projects was designed; faculty established the criteria and evaluated the applications; and the winners were acknowledged at a Governor's Conference on Higher Education.

Evaluation

The FFR initiative is inherently linked to institutional assessment programs and the design of statewide performance indicators. Institutions annually submit data for statewide analysis on all FFR elements. Missouri then reports on its progress toward its public policy goals, including those associated with FFR. In addition, institutions submit an annual accountability report concerning FFR dollars linked to campus teaching and learning improvement projects.

During the life of the FIPSE grant, external evaluators made annual site visits to Missouri, met with stakeholders, and submitted a report of their findings. During the second year of the grant, a questionnaire measuring the level of familiarity and support for FFR was distributed to all full-time faculty. Acknowledgments, comments, and inquiries by external audiences concerning FFR are being tracked as an additional source of data.

Project Impact

Missouri's public colleges and universities are working together to ensure access, quality, efficiency, and an overall improvement in the state's system of higher education. While FFR is still in its infancy and financial support continues to change, the state has reaffirmed its commitment to performance funding as a strategy for change, and FFR has become more coherent as a major public policy initiative.

To date, positive results associated with FFR include increases in the assessment scores of graduates, both in general education (72 percent to 76 percent for baccalaureate degree students; 19 percent to 81 percent for associate degree students) and in the major (63 percent to 83 percent for baccalaureate degree students). There have been increases in pass scores for baccalaureate students on licensure, certification, or registration examinations (83 percent to 87 percent for baccalaureate degree students, 82 to 96 percent for associate degree students); increases in the six-year graduation rate for public four-year institutions from 47 percent to 48 percent; and increases in minority graduation as a percentage of the graduating class for baccalaureate students from seven percent to ten percent. The number of community college students transferring successfully to four-year institutions has increased 16 percent, and community college vocational job placements have increased from 69 percent to 76 percent. While the causal relationship between FFR and these achievements is not conclusive, FFR is clearly responsible for the identification of priorities for funding, for the establishment of assessment measures, and for helping institutions to accept that part of their state allocation is linked to results.

In addition, as a result of FFR, all 31 public campuses have chosen to participate in the design and implementation of faculty-driven teaching and learning improvement projects.

While the long-term effect of this initiative is not known, initial results indicate an increased interest and enthusiasm from faculty for this effort (at one university, during the first year alone 69 proposals outlining new teaching and learning initiatives were submitted). Institutions' accountability reports suggest some preliminary findings. For example, greater retention, higher GPAs, and increased satisfaction result when students are involved in learning communities; at-risk students experience higher completion rates and increased retention (from 68 to 82 percent) when participating in specialized instruction that emphasizes subject matter and individual needs; and mean ACT composite scores increase for students involved in critical thinking projects.

Between FY 1994 and FY 1999, Missouri's public four-year institutions received an addition to their base budget of $42,098,768 from FFR, representing 16.7 percent of new money allocated. Included in this amount is a $2.7 million annual allocation for teaching and learning improvement projects. Public two-year institutions began to receive FFR money in FY 1995. Through FY 1999, their total of $7,174,671 represents 13.4 percent of new money, of which $1.4 million is dedicated annually to teaching and learning improvement projects. Presidents and chancellors of Missouri's public institutions have expressed their support for allocating one percent of each institution's operating budget to these projects.

Initially, the concept of performance funding was widely questioned. Some educational leaders believed that increased financial support should be considered an entitlement associated with inflation. FFR was also resisted as an intrusion into the operation, management, and structure of each institution. These perceptions changed during the project. In its second year 32 percent of Missouri's faculty at public institutions returned a survey on FFR. More than a third of those responding indicated that they were familiar with FFR and, after reading a fact sheet, over 67 percent indicated support for its goals.

Lessons Learned

Initially, several administrative representatives were critical of the FFR initiative and suggested that it not be officially launched until all questions could be answered and problems resolved to greater satisfaction. However, by maintaining its commitment to move ahead with performance funding even without a perfect model in place, Missouri was able to make substantial progress in a short time. The fact that FFR started with low financial stakes further helped to reduce anxiety and increase ownership.

Making participation in the teaching and learning improvement aspect of FFR voluntary removed institutional defensiveness. The reward for participation was large enough to get the attention of all public campuses within the state, yet small enough to avoid criticism that FFR would be taking money away from other important agendas. By establishing broadly defined eligibility criteria, the common goal of teaching and learning improvement was promoted while, at the same time, flexibility was allowed in the design and implementation of particular teaching and learning improvement projects.

Maintaining commitment in the face of adversity requires constant communication. Identifying and addressing myths associated with performance funding early in the process by, for example, helping faculty and administrators see FFR as a strategy to promote and acknowledge results rather than as a bureaucratic demand reduced misunderstandings. Commitment to a common vision and the use of consistent language helped to increase support across diverse groups. By initially building identification with the overall goals and benefits of a performance funding system related to institutional missions and goals, different opinions about choice and definition of data elements and allocation structures could be explored without threatening to collapse the initiative.

Perceptions of a new initiative are inherently linked with images of additional work and time commitments which will compete with established agendas. FFR was often viewed as an add-on to existing initiatives and, as a result, was initially pushed aside with a promise to be given attention at a later time. Promotion of FFR as a new approach that should be integrated into planning initiatives rather than as a new activity helped to shift the emphasis to a redesign of existing activities.

In systemic statewide change efforts, faculty voices are often not heard early enough in the process. By identifying improvement in teaching and learning as a central tenet of statewide policy reform, designing a structure that requires faculty participation, and fostering communication among faculty across departmental, college, and institutional boundaries, FFR captured faculty interest, excitement, and involvement early in the change process.

While the lack of explicit assumptions in the first year of FFR created some discomfort, this had the unintended effect of allowing differences of opinion to coexist as faculty and institutions gained experience with this new approach. As the tension increased between opposing positions, e.g., evaluation of student outcomes vs. program performance as an appropriate unit of analysis, differences of opinion were resolved by the adoption of explicit assumptions. As FFR continues to evolve, these assumptions will help to guide the review and revision of this initiative.

Colleges and universities often initiate strategic planning, design assessment programs, and recommend budgets without understanding the importance of integrating these three activities. FFR has been used as a unifying concept by which each of these activities becomes interdependent. Funding of higher education should not exist in a vacuum; it should be driven by previous planning priorities and assessment results. By aligning these three activities, requests for additional resources do not emerge sporadically but are directly linked to planning priorities and results.

Inherent in FFR is a commitment to systematic measurement. At first, many of the FFR elements placed an emphasis on demonstrating increased activity, e.g., increasing the number of students participating in assessments. The introduction of quality measures has helped to shift the emphasis. For example, institutions no longer are rewarded for merely doing assessment but for how students perform on particular assessments.

FFR uses a finite list of measurements to determine particular budget recommendations based on performance. The difficulty of identifying key performance indicators and then prioritizing funding elements was not anticipated. Measurement sends a powerful message about what is perceived as important. Suddenly, colleges and universities were no longer criticizing measurement systems by citing imperfections and limitations but, rather, were calling for a massive data system to ensure that every activity of importance was measured and potentially rewarded. One challenge to FFR is to help institutions understand that massive data systems have limited use in informing policy discussions.

The ability to bring about systemic change requires more than genuine interest and conceptual commitment. The magnitude of effort required when working with total systems can become overwhelming. Designing an open process in support of new policy formulation and development, mediating different perspectives among diverse groups, and maintaining an appropriate balance between discussion and action demand a keen sense of timing, an ability to take risks, and an appreciation of traditions.

Organizational decisions are often made without the internal staff's full understanding or support. Time was allotted during the first year of the project to make site visits to campuses throughout the state, but project staff failed to anticipate the amount of time required to explain and to build support with key internal staff in the agency. The importance of horizontal communication with peers and of building a solid support base from within cannot be overstated.

Higher education faculty and administrators tend to spend inordinate amounts of time dissecting and evaluating ideas through extensive examination, explanation, and critique. To capture the attention and maintain the interest and support of the public, legislators, and the governor, on the other hand, requires consistent, concise, and convincing messages. Project staff initially underestimated the importance of redesigning communication styles and presenting content clearly for external audiences.

Missouri's commitment to redesign budget policies to include FFR raised the stakes associated with data reports. In the early years of the project, interest in accountability directed overwhelming attention to external audiences, at the expense of internal audiences. This imbalance reinforced compliance, especially at heavily regulated institutions. Missouri is expending greater effort than was originally anticipated at integrating accountability and improvement initiatives to increase faculty involvement, interest, and responsibility.

Changes that withstand the test of time inevitably face challenges from emerging leaders who are motivated to establish credibility, influence, and impact. When administrations turn over, the tendency to associate programs with individuals rather than with systems can harm existing initiatives. To ensure that reform efforts remain apolitical, bipartisan support must be garnered, nurtured, and maintained.

Project Continuation and Recognition

Recent discussions by presidents and chancellors from public two- and four-year institutions indicate general agreement that, while FFR should be reviewed and improved, the basic approach is working. In February 1998, the Missouri Coordinating Board for Higher Education reaffirmed its support for FFR and established a set of guiding principles to help shape any future revisions to its performance funding policy.

External consultants identified several strengths of FFR and indicated that Missouri's emphasis on teaching and learning could provide a national model for good practice. The state's successes in continuing to build campus ownership, in promoting networking to improve teaching and learning, and in using FFR as a catalyst for change were considered noteworthy.

Missouri has been challenged to improve its communication with a larger group of legislators, to develop a more rigorous and standardized assessment of teaching and learning improvement projects, to create a better alignment with new state initiatives, and to monitor the long-term effect of FFR on institutional budgets.

FFR was featured as a case study during the 1997 Education Commission of the States' National Conference. It was also referenced in "Grading Colleges Requires More Than Math," an article in the November 9, 1997, "Week in Review" section of the *New York Times*. According to one national expert on performance funding, Missouri's program is evolving so that it ". . . can show the country how to make performance funding not just a passing phenomenon but a lasting success."

Available Information

This project has generated a number of articles, brochures and reports. General information about the project and copies of published materials may be secured by writing or calling:

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PRAIRIE VIEW A&M UNIVERSITY
Developing Effective Performance Indicators for Different Learning Environments

Purpose

During the past few years, higher education found it increasingly necessary to explain and defend itself to a variety of internal and external constituencies. Such demands for assessment and accountability resulted in a growing trend toward the use of performance indicators. However, there existed no model or process for the regular and public assessment of the degree to which a university and its agencies were achieving the state's goals and fulfilling priorities. The primary purpose of this project, using three campuses of the Texas A&M University System (TAMUS), was to develop and disseminate such a model and process, along with a list of valid, explicit, quantifiable performance indicators suitable for longitudinal analysis of achievement and productivity.

Innovative Features

It was agreed at the onset of planning that any accountability system developed must champion the cause of multiple missions and advocate the principle that differences in mission do not imply differences in quality. By recognizing and advocating a variety of emphases in mission the TAMUS model responded to individual campus missions and rejected the traditional conflict in priorities among teaching, research, and service. Accompanied by a core of indicator activities that all institutions must perform, the model contributes to the accountability that flows from clarity, fulfillment, and measurement of individual institutional mission.

In early 1996, TAMUS set about to assess performance within its ten universities and eight agencies by developing an accountability system that included reporting periodically on the results achieved in relation to goals assigned and resources received from its public benefactors. Guided by the principle that consensus and shared ownership are crucial in developing performance measures, the chancellor initiated a participatory process for developing the core of indicators that would apply systemwide, researching measures to ensure their validity, providing options for individual institutions and agencies, and involving faculty leaders.

Four systemwide task forces were established. Membership from the universities and agencies included faculty senate leaders, senior- and mid-level administrative staff, from chief executive officers to student affairs, and lay members from advisory groups within TAMUS. The charges for the four task forces were as follows: develop a TAMUS response to changing state needs, develop or refine processes, as needed, to ensure effective participation by external interests in targeting teaching, research, and service, develop a list of valid, explicit, quantifiable performance measures suitable for longitudinal analysis of achievement and productivity, and develop guidelines for financial incentives that are linked to performance measures.

The task force recommended the following key accountability areas and indicators for evaluating and improving academic quality in TAMUS. The task force also recommended that certain core indicators in these areas (indicated by asterisks in the list below) apply to all members.

1. Mission Focus and Fulfillment

- Development of an approved strategic plan to support the mission statement *
- Demonstrable attainment of goals contained in the approved plan*
- Institution's or agency's contribution to the state of Texas or region*
- Percentage of total dollar value to historically underutilized businesses*
- Institution's or agency's contribution to the state of Texas Higher Education Planning Benchmarks, 1997-2001

2. Quality of Faculty

- Academic and other credentials of faculty
- Ratio of full-time faculty to full-time employees
- Accreditation of degree-granting programs
- Average annual salaries for full-time faculty by rank

3. Teaching Quality and Effectiveness

- Percentage of lower-division classes taught by tenured or tenure-track faculty*
- Percentage of students completing courses*
- Graduate or current student satisfaction with the instruction provided (for example, student opinion surveys and "consumer feedback")
- Graduation rates of first-time, full-time, first-year students*
- First-year retention rates, broken down by student demographic groups*

4. Student Success

- State licensure examination pass rate (for example, EXCET and PE exam)
- Employers' satisfaction with graduates
- Number or percentage of graduates who have employment in their choice fields of graduation
- Degrees granted by levels
- Pass rate on Texas Academic Skills Program categorized by student demographic groups
- Percentage of graduates accepted to graduate and professional schools by the time of graduation

5. Financial Responsibility and Efficiency

- Net total current fund revenues to total current fund revenues*
- Net auxiliary enterprise revenues to total auxiliary enterprise revenues*
- Administrative cost as a percentage of total institutional expenditures*
- Space utilization ratios of classrooms and laboratories*
- Education and general expenditures per full-time equivalent (FTE) student
- Education and general expenditures per credit hour
- Plant equity to plant debt (ratio)
- State appropriations as a percentage of total revenues
- Total private gifts as percentage of state appropriations
- Annual education and general expenditures per degree awarded

6. Research Funding and Quality

- Annual amount of research dollar expenditures*
- External or sponsored research funds as a percentage of state appropriations
- Number of dollars in non-state, nonlocal research support
- Ratio of non-state-to-state research dollar expenditures
- Annual income from patents, licenses, agreements, and copyrights
- Annual research dollar expenditures generated per FTE graduate student

7. Institution and Agency Cooperation and Collaboration

- Number of articulation agreements with community colleges
- Number of transfer students to and from the institution
- Number of collaborative projects with other state institutions and agencies
- Number of institutional partnerships with K-12 school districts

8. Public Service

- Institution's or agency's level of service to Texas residents as measured by enrollment in extension and service programs (for example, distance education, arts, and health-related services)
- Public service hours of library (number of hours per week library open)
- Number and dollar amount of institution's or agency's resources, services, and expertise made available to meet a community need outside the context of the instructional and student services program

* Indicators currently required of all state institutions by the Texas legislature

Each TAMUS institution and agency first prioritizes the above eight accountability areas and then the mission-specific indicators. The task force recommended that the institutions and agencies limit their indicators to a total of 20. The primary philosophy is continuous performance improvement and value added through time, rather than performance comparison. The TAMUS institutions and agencies are currently working within these parameters to come up with their respective models.

Evaluation

In addition to the involvement of several system-wide committees, the ultimate evaluation of the model and the process will be its adoption, all or in part, by TAMUS and the Texas state government. Beginning in December of 1998, the Texas State Legislature required all institutions to formally report and comment on their performance for 1996, 1997, and 1998—the first of an ongoing set of hearings concerning results of the indicator model. At present, the effort is to secure more buy-in for the model among internal and external stakeholders, particularly campuses in the TAMUS.

Numerous publications and presentations which flowed from the project and the reaction from such events gave the project validity, as did professional evaluation and acceptance of the results by a myriad of international, national, and regional forums and publications. However, the primary indicator of the project's success, set out in the original proposal, was the general acceptance of the model by the state of Texas.

Project Impact

The movement toward developing a formal system of accountability constituted a pre-emptive strike designed to heighten the effectiveness of TAMUS and improve the public's and policy makers' understanding of and confidence in TAMUS and higher education in general. By developing such a pre-emptive strike, TAMUS managed to forestall possibly harsher legislative actions.

Lessons Learned

The number of performance indicators used in a given system probably should not exceed 20. The goal should be to produce a general institutional assessment rather than a precise measurement. Indicators are simply one of many tools available to monitor quality assurance, enhancement, efficiency, and effectiveness.

State-level or top-down models do not normally produce the constructive, substantive, and sustained results that campus-based and -initiated performance systems produce. Externally imposed systems are rarely accepted by internal stakeholders, such as faculty. The frequent result is resistance rather than reform.

Two central constituencies essential to the success of such models are the faculty and the legislature. Both parties need to be involved in developing the model and need to buy into the processes. Change must be initiated by an institution's administrative leadership.

The performance indicators proposed often lack validity and reliability. This shortcoming is particularly prevalent in top-down, externally imposed systems that have been hastily adopted, using what Ewell (1996) termed "legislation by fax." The public and legislature seem enamored of certain indicators, such as small classes and senior faculty teaching lower-division courses, that are not necessarily effective in promoting learning.

Capstone institutions will be limited somewhat in the qualitative improvement they can demonstrate with certain growth-oriented indicators, such as persistence rates and graduation rates. Rather than a value-added approach, benchmarking with a national sample of institutions, the approach employed by the State University of New York, may offer greater promise for demonstrating efficiency and productivity.

A single indicator model cannot be applied to all types of institutions effectively without diminishing or distorting diverse missions and exacerbating the traditional conflict in priorities among teaching, research, and service. Flexibility is necessary to fit the mission of the institution or agency.

Despite the current campus emphasis on using qualitative vehicles such as portfolios, in the case of state systems, performance indicators should almost always be quantitative in nature, because policymakers are dubious about results that cannot be audited, verified, or submitted to precise comparison. Furthermore, graduate education and agency performance, for example, are rarely incorporated into these models. Improving undergraduate education was paramount during the early development of such indicator systems, particularly top-down models, but the current trend is toward ensuring better use of resources, and linking resources to outcomes.

The indicators should have real financial incentives for institutions and agencies, and direct individual rewards for those directly responsible for success in meeting the goals.

Finally, many of the accountability systems that have been ineffective failed to embrace or communicate in timely, understandable terms the results obtained from the performance indicator model. Innovative approaches such as a home page on the Web, a flier of the sort used by the Colorado System, and an insert for the Sunday edition of the major papers are ways to get an institution's message across.

Project Continuation

The results of the project have been shared with a number of institutions and states. For fiscal year 1999-2000 the state of Texas has added some indicators to its statewide system and particularly focused on a specific set of indicators for athletics. It is unknown how performance indicators will be transformed into funding elements, but the project plans to compare its results to a set of national benchmarks, to gauge its progress on institutional goals in state agency and system planning efforts, and to gauge consumer satisfaction with the educational product.

Available Information

The project has generated three monographs, several articles, a set of published proceedings, and several national and one international presentation. General information about the project may be obtained by contacting the following:

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IX. DISSEMINATING PROVEN REFORMS

"DISSEMINATING PROVEN REFORMS"
AN OVERVIEW
Robert E. Shoenberg

"Disseminating Proven Reforms" is devoted exclusively to multiplying the effect of successful innovations. FIPSE has for many years made dissemination grants through the Comprehensive Program, with the grantee institutions using a variety of processes for broadcasting their successes. "Disseminating Proven Reforms" differs from those earlier efforts in that it is devoted exclusively to dissemination and employs a single mentoring model as the means of propagating programs.

The Format

The purpose of dissemination is to "grow" new programs, similar but not identical to the original, in places where they did not exist before. Disseminators often use agricultural analogies and terms like "growing," "broadcasting," and "propagating" to describe different approaches to their work. Making conference presentations and publishing materials, for example, might be compared to scattering seeds randomly over unprepared ground, where few, if any, will germinate, take root and thrive. "Disseminating Proven Reforms," on the other hand, uses what could be described as a grafting strategy, attaching buds and branches to strong rootstock. While this method affects only a few plants, if the soil is right and the plants are well fed and watered they will grow and continue to propagate. Here the graft represents the innovation that has proven successful at the college or university where it was developed, and the rootstock symbolizes the institution committed to adapting the innovation. The soil represents the circumstances at the adapting institution; the water, the tutelage and encouragement of the mentor institution; and the fertilizer, sufficient funding to encourage the efforts of both mentor and adapters.

Dissemination has the fullest and most lasting results when the creators of demonstrably strong programs are brought into a one-on-one working relationship with those who are willing and ready to adapt their innovations. The association between mentor and adapter needs to be sustained (as opposed to a single consulting visit) and personal, with each party acknowledging its obligations to the other for the success of the process.

"Disseminating Proven Reforms" was designed to embody these principles. The 13 mentor programs were chosen on the basis of their efficacy as evidenced by appropriate outcome measures. Sometimes these were statistical measures, but not all programs lent themselves to such assessments, and those that did not were judged on the basis of more qualitative evidence. The applications to the competition came from mentor institutions who had already chosen and secured commitments from their adapters. The likelihood that the adapting institutions would prove fertile soil for dissemination was an important consideration in the selection process.

The grants were for two years. The "Disseminating Proven Reforms" model called for conferences of mentors and adapters on the former's campus at the beginning of the project and in the second year. FIPSE wanted the adapters to have a sense that they were involved in a larger project than the one at their own institution, and to see the program they were adapting in action on the mentor campus.

Funding was also provided for the mentor to visit each of the adapting campuses once a year. Primarily intended to provide advice and encouragement, these visits also served to allow mentor interaction with a wide group of faculty and administrators on the adapting campus. In addition to providing opportunities to display the expertise of the mentors, the visits also allowed the mentor to run interference with administrators on behalf of the project, and for the adapters to publicize their efforts internally (and occasionally externally as well). All but one of the mentor-adapter clusters of institutions followed this model. The exception, the Stanford University-led service learning group, is discussed below.

Each cluster was committed to using a common assessment strategy to measure the success of the project. In some cases (e.g., the Anne Arundel Community College and Moravian College clusters) adapters simply used the instruments that the mentor institution had employed. Others, such as the Stanford cluster, designed an entirely new assessment strategy.

The visits and the assessments provided numerous occasions for mentor and adapters to be in touch, and the mentors agreed to make themselves available by telephone or mail to answer questions as they arose, thus ensuring frequent, personal contact. However, contact among adapters between conferences was infrequent, although several clusters established automated Internet mailing lists or listservs for the purpose.

Compared to FIPSE's Comprehensive Program grants, those for "Disseminating Proven Reforms" were modest: $30,000 per year for the mentor and $10,000 per year for each adapter. Mentor funding was intended to cover costs for travel to the adapting institutions, the on-site costs of the conference, communication and materials costs and some release time. For the adapters, funding covered travel to the conference site for teams of three. The remaining funds were to be used at the adapter's discretion in direct support of the program.

Some Specific Examples

The clusters described in the following vignettes are highlighted because of the overall success of their work and because they represent a range of the processes and outcomes that result from disseminating different types of innovations. Though these are singled out, others were equally successful. Indeed, no cluster was unsuccessful, and nearly all achieved what FIPSE had hoped.

The range that these programs represent may be described by a simple typology that has proven useful for analyzing a variety of aspects of "Disseminating Proven Reforms." The typology is based on the nature of the reform being disseminated, which affects the way that mentors and adapters interact, the nature of their cluster meetings and the mentors' visits, the pace and manner of adaptation, and the assessment strategies.

This rough but useful typology of reform "products" that are being "distributed" places them on a continuum of particularity, ranging from a fully defined package (Type 1) to a general concept (Type 4). At the more specific end are reforms like the California State University, Chico, introductory accounting sequence or Moravian College's mathematics program, which consist of fully developed curriculum materials that adapters modified to suit their programs. By contrast, at the general end one finds Eckerd College's strategies for using retired professionals or Stanford's experience with community service programs, which served merely as prompts to inform the work of the adapting institutions.

The mentors disseminating the more "packaged" reforms generally proceeded by instructing the adapters in the content and uses of the strategies and materials that they had developed. Thus the City College of New York (CCNY) "Fluency First" mentors conducted 20-hour training sessions on each of their six adapting campuses. Similarly, the staff of the Anne Arundel Community College tutorial program devoted their opening workshop to a detailed exposition of their procedures and training materials. At the other end of the spectrum, Stanford's mentors acted more as catalysts, arranging for institutions that were developing quite different community service models to share ideas with each other.

To elaborate this description, we might place the 13 dissemination projects at four points on the continuum from particularity to generality of the product being disseminated, as follows:

Type 1. A set program: the disseminator had a fully developed package of materials to pass on to the adapters. Because the audiences of the adapters were the same as those of the mentors (e.g., students in an introductory math course or medical residents), the package could be taken over with only limited modifications.

- Anne Arundel Community College ("Supplemental Instruction")
- California State University, Chico (introductory accounting)
- Moravian College (integration of precalculus topics into introductory calculus)
- University of Illinois College of Medicine (using patients as instructors for medical residents)

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Type 2. A set strategy: the disseminator had a very specific way of going about the activities in which it was instructing the adapters, who then used that strategy to meet local needs. Adapters applied the strategy to audiences that were often different from those of the mentors.

- CCNY "Fluency First" (teaching reading and writing to ESL students)
- CCNY PASS Program (a school-to-college "bridge" program for students in science)
- Dickinson College (workshop physics)
- Pace University (case method in education courses)

Type 3. A general strategy: the disseminator had developed an innovative strategy to meet certain goals which adapters modified freely to suit local conditions.

- Binghamton University (languages across the curriculum)
- Central Missouri State University (continuous quality improvement [CQI] strategies for academic programs)
- Eckerd College (senior professionals as student mentors)
- University of Missouri (teaching alternative dispute resolution in law schools)

Type 4. A broad concept: the disseminator's general approach to educational practice had wide latitude for applications, often in ways far removed from those of the mentor campus.

- Stanford University (service learning)

As part of a continuum, these four discrete "positions" are not sharp divisions, and they tend to blend into each other. The projects highlighted in the following descriptions represent each of the four types. The Anne Arundel Community College project leads off not only because of its uniform success but because it comes closest to following the pattern that FIPSE had in mind in laying out program guidelines. Moravian College's "just in time" approach to teaching precalculus topics in the context of the introductory calculus course is the kind of tightly focused, department-specific innovation typical of Type 1. The California State University, Chico, introductory accounting model (Type 1) illustrates how the institutional culture, particularly the faculty culture, into which the innovation is introduced can produce widely differing outcomes.

The "Workshop Physics" group (Type 2), led by Dickinson College, demonstrates that institutions with quite different students and resources can all adapt a strong model with demonstrably beneficial results. This group's assessment process was especially strong. Another Type 2 project, City College of CUNY's program for supporting at-risk students in the sciences, shows institutions adapting a basic idea to a wide range of administrative structures.

The University of Missouri Law School and its adapters (Type 3) illustrate the possibilities of using a formal dissemination process for introducing a paradigm-shifting change, alternative dispute resolution, into standard curriculum and teaching structures. The service learning cluster (Type 4), organized by Stanford University, exemplifies a successful approach to dissemination and assessment that is quite different from the rest.

Lessons Learned

The results of this first cycle of Disseminating Proven Reforms demonstrate the strength of the model. By a conservative estimate, 55 percent (39) of the 71 adapting institutions fully institutionalized the activity they set out to adapt, and another 25 percent (18) appeared likely to do so. For only five of the adapters did the innovation fail to take hold, for reasons ranging from outright rejection after a trial period to inaction.

The effects produced by the model are not uniform across types. The more discrete and bounded the innovation, the better the model worked. Whereas 67 percent of the Type 1 adapters institutionalized the innovation, only 57 percent of the Type 2s and 42 percent of the Type 3s have done so to date. Seventy percent of the adapting institutions where the innovation continues only in a weak form are of Type 3. (The single Type 4 group is omitted from this discussion because its dissemination approach was so different.)

The Type 3 innovations, being less particular, broader and more complex, simply take longer to implement. CQI programs like Central Missouri's, particularly when instituted in the context of academic programs, generally require far more than two years to take hold. Similarly, Eckerd's successful efforts to bring retired professionals into the classroom in support roles required a substantial investment and administrative effort, not to mention faculty commitment, that may take a few years to put in place.

On the other hand, a mathematics department willing to try integrating precalculus topics into calculus courses using a "just in time" approach, rather than teaching the courses separately, has only to train itself to do so. No one outside the department, other than perhaps the campus curriculum committee, needs to be consulted. Thus the Type 1 and 2 innovations, which tend to be confined to particular departments and to require the consent of fewer people at lower administrative levels, seem most amenable to this kind of dissemination, at least in the short run.

The Type 1 and 2 innovations, particularly the former, are less transformative, require less of a change in thinking and pose less of a challenge to the culture of the unit adapting them. Type 3 innovations, on the other hand, particularly those resembling the CQI and alternative dispute resolution programs, are truly revolutionary and thus harder to institute under any model.

Much of the success of this model appears to lie in the skill of the mentors and the frequent contact of mentors and adapters. Apart from the personal qualities of the mentors, the regular schedule of meetings and visits provides incentive for the adapters to keep moving. The expert external to the institution is both a source of support and a reason to avoid the embarrassment of non-performance.

Adapters rated personal contact with the mentor as most helpful. With few exceptions, telephone and e-mail contacts with the mentor were not initiated by the adapters, however, and tended to be used mostly for project logistics and administration. Most found the two group conferences useful as a source of mutual encouragement and a convenient means of conveying basic information about the details of an innovation and strategies for implementing it. Communication among the adapters outside of these meetings was virtually non-existent.

FIPSE's financial contribution, small though it was, appears to have been enough to generate the necessary effort. In fact, simply participating in a national project sponsored by a well-known funder is a powerful incentive. The formal recognition that selection implies moves a project to the top of the list of things to do.

Assessment tends to be the most difficult where the programs are the least defined, and where student outcomes lie beyond the grant period. Mentor institutions for most of the Type 1 and 2 innovations adapted the assessment models of the original projects, but others had to devise new protocols, an effort that was particularly successful with the Dickinson, Stanford, and University of Illinois, Chicago Medical School clusters. Some clusters simply could not find a suitable process for project-wide assessment.

The examples that follow represent all four project types and illustrate the successes and some of the disappointments that even strong programs must accept.

SUCCESS OF ADAPTATION BY DISSEMINATION TYPE

Type (# of Adapters)	Fully Institutionalized	Strong Continuance	Weak Continuance	Discontinued
I (21)	14 (67%)	4 (19)	0	3 (14)
II (21)	12 (57%)	7 (33)	2 (10)	0
III (26)	11 (42%)	6 (23)	7 (27)	2 (8)
IV (3)	2 (67%)	0	1 (33)	0

ANNE ARUNDEL COMMUNITY COLLEGE CLUSTER
Supplemental Instruction with Mentoring Support

PRINCIPAL MENTOR: Rosemary Wolfe, Education Program
ADAPTERS: Ashland Community College, Community College of Philadelphia, Daytona Beach Community College, Dutchess Community College

The Innovation

Supplemental Instruction with Mentoring Support (SI) provides academic help to students enrolled in difficult required introductory courses (defined as those which students frequently fail or leave), while creating opportunities for faculty professional development. The program trains students and faculty to work together through a learner-centered approach of peer-group study and faculty mentoring support. Study sessions are led by community college students who have successfully completed the course and who attend classes again with enrolled students. During the study session, the student leader uses course material to teach skills for learning and organizing the content. Faculty, who are trained in learning strategies, attend classes and study sessions in courses outside their disciplines and serve as mentors to student leaders.

Outcomes

All four campuses established programs within the first year of the project, expanded them to additional courses, and plan to continue their work. Two of the campuses deviated from the mentor's program by focusing part of their efforts on non-credit developmental courses, while a third targets bridge courses for English as a Second Language (ESL) students. Two of the adapters use the model solely in mathematics and science courses. One uses the instructors who teach the courses, rather than faculty in other departments, to mentor the student leaders.

Two of the adapters were able to integrate program support into their budgets, because their units can designate funds for their own purposes. The others succeeded in getting long term allocations from higher levels in their institutions. The adaptations are fully institutionalized at all four colleges.

This project followed the model plan of Disseminating Proven Reforms more closely than any other. The mentors conducted a workshop on their own campus, followed by site visits to each of the adapters in both years of the project, and a concluding workshop. The opening workshop for this group was exemplary. The mentor had prepared a large collection of materials: descriptions of various aspects of the program, forms for program administration and evaluation, reports of outcomes at the mentor institution, and hands-on exercises. Activities for the group were varied: short presentations, observation of various aspects of the program, conversations with student discussion leaders and faculty mentors, active learning exercises and discussions, individual team planning and meetings with the mentors. Timing, design of materials and practical arrangements had been carefully thought through.

The initial site visits were used to provide an explanation of the program to a broad campus audience and to help the team with a range of practical details. The mentor was of particular help to some faculty project leaders who had little experience with administrative details and structures.

Assessment

The adapting institutions replicated the assessment that Anne Arundel Community College had used for its own project. The central question of this assessment was whether those students who chose to participate in the entirely voluntary supplemental instruction sessions earned a greater percentage of A, B and C grades (as opposed to Ds, Es and withdrawals) than those who did not participate.

Across institutions, SI participants on the average earned significantly higher course grades and a lower percentage of D/F/W grades than nonparticipants. This result held for business, math, and science courses, which are the ones usually designated for SI support, as well as for ESL students. SI participants in developmental courses had final grades significantly higher on average than nonparticipants, but they did not receive a higher percentage of A, B and C grades. Developmental students also tended to attend both SI sessions and regular classes less assiduously.

The superior performance of the SI participants did not appear related to any measurable academic superiority that they brought to the courses, although they may have been more motivated than nonparticipants.

Surveys and observations of faculty teaching and faculty journals showed positive effects of SI on teaching. Faculty incorporated active classroom assessment techniques as a result of the program's training and their participation as mentors. The interdisciplinary experience of having faculty become students in a content area outside their own promoted collegiality as well as a clearer understanding of how students learn.

Further Dissemination

Ashland Community College, through the Kentucky community college system office, and Dutchess Community College, through the New York State system office, plan to bring their work to the attention of institutions statewide. Daytona Beach Community College has begun to work with branch campuses to introduce SI.

Available Information

Further information may be obtained from:

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CITY COLLEGE OF NEW YORK (CUNY) "PASS" CLUSTER
A Summer Bridge Program for Underprepared Students in Science

PRINCIPAL MENTORS: Millicent Roth and Michael Weiner, Office of the Dean of Science

ADAPTERS: Manhattanville College, Onondaga Community College, SUNY College at Brockport, SUNY College at New Paltz, University at Albany, University at Stony Brook

The Innovation

The Program of Access to Science Study (PASS) was designed by faculty at the City College of New York for underprepared students planning to pursue study in science-related fields and is offered in the summer before full matriculation. PASS consists of a preparatory science course with a special counseling component. This combination addresses underprepared students' lack of problem-solving skills and their failure to become integrated into the academic and social life of the college.

The adapting institutions were interested in the general principles of the City College model, modifying the form to fit local circumstances. Some stayed with the summer program model; some integrated similar efforts into academic-year programs; and some combined summer and academic-year activities. However, all retained the combined problem-solving and counseling focus.

Outcomes

In general, all the adapters were able to create a "bridge" course dealing with science topics and an accompanying counseling component. Most of the programs were able to identify sources of funding, either internal or external, which will support their continuance in forms compatible with their original intentions, and reflecting the essential elements of the City College program. Furthermore, in the majority of cases, the PASS model was extended beyond the course or department where it was originally adapted into other areas.

For example, at one institution the project evolved from a summer preparatory program to an academic year program in the form of a "discussion group" offered in conjunction with the Biology I course. It includes a review of class material along with a PASS-style seminar. The discussion groups are also being offered with Biology II and with courses in general chemistry and organic chemistry. And they are open to all students, not just those identified as underprepared. At another campus, the initial summer program to prepare students for first-year college biology was expanded to support well-prepared as well as at-risk students in several science courses. At a third institution, the original adaptation involved a preparatory course in the physical sciences for engineering and physical science majors. It has since been expanded to a preparatory course in the biological sciences for majors in that field. Students taking one of these PASS-style courses may use the course credits toward the fulfillment of degree requirements.

These examples indicate the potential of the PASS model to take hold at adapting campuses. Continuation requires cooperation between academic departments and student support services, and shared enthusiasm for the program.

Assessment

The project directors employed an evaluator to track and assess student outcomes at the adapting institutions. This assessment, which looks at student performance and behavioral and attitudinal changes, has been completed for spring, summer and fall terms of 1996 and spring of 1997.

During this period, the six institutions served a total of 157 students: 48 at Albany, 31 at Stony Brook, 28 at Onondaga Community College and smaller numbers at the rest. The students were somewhat older than traditional entering students, markedly older at Brockport and Onondaga. About 75 percent were minority students.

PASS students at four of the institutions had a higher retention rate after two college semesters than did the general college population. At one the rate was the same, and at another, marginally lower. PASS grades proved a moderate to strong predictor of grade point average, both overall and in math and science. Positive changes in student behavior during the

PASS program also correlated strongly with future academic performance. Given that underprepared students are less likely to persist and do well than the general college population, even outcomes for PASS participants similar to or slightly lower than those for the general population should be considered indicators of success.

The best of these results closely track those achieved by the mentor institution. The assessment also provides data on such matters as student attitudes toward the program, which are generally highly favorable, and correlations between student self-assessments of behavior and faculty and counselor assessments.

Available Information

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DICKINSON COLLEGE CLUSTER
Workshop Physics

PRINCIPAL MENTOR: Priscilla Laws, Department of Physics and Astronomy

ADAPTERS: Carroll College, Forsyth Technical Community College, Nebraska Wesleyan University, Skidmore College, University of Northern Iowa, Whittier College

The Innovation

Workshop Physics replaces traditional lectures and laboratories with guided inquiry workshops featuring microcomputers and specially designed apparatus to help students to learn by doing. Dickinson College pioneered this work in 1986 and has created an extensive activity guide and designed much of the software and apparatus to develop students' reasoning skills and enhance their understanding of essential physics concepts.

Outcomes

All six of the original cluster members continue to make progress in adapting Workshop Physics, albeit with varying degrees of success. The institution that progressed furthest began to implement Workshop Physics as soon as the project started in 1995, and used substantial portions of the workshop guide and pedagogical approach of the Dickinson program. Another, with extensive experience in activity-based instruction, used project participation to extend those instructional strategies to an additional course, adapting the spirit though not the materials of the Dickinson approach.

At the other extreme, just after the project began another adapting institution's physics program was reduced to one full-time faculty member and assumed a purely service role. These changes severely limited the time available for implementing the extensive transformations that Workshop Physics requires, with the result that the course was not offered until fall of 1997. At another college, also with a declining science program, interest in the reforms has so far been limited to the project participants.

The physics department at Forsyth Technical Community College found strong support from administrators and from faculty in programs that require physics. Another institution has found Workshop Physics particularly useful for training future science teachers.

Four of the six institutions adapted large portions of the mentor's materials and pedagogy. The other two, while including some workshop elements in their introductory courses, reinvented much material and strategy to better fit perceived local needs.

All experienced common startup problems caused by demands on faculty time and the cost of and lack of technical support for an equipment-intensive program. Faculty were generally inventive in creating less expensive adaptations of the Dickinson laboratory exercises until they could acquire the necessary hardware.

Some faculty not directly involved in the project resisted the workshop approach because of the loss of control that comes with the self discovery pedagogy, with the result that two of the institutions returned to substantial amounts of lecturing, while retaining some workshop elements. In doing so they were also motivated by the need to cover more material than discovery methods permit.

Workshop Physics also encountered resistance from students who were not ready for an active learning situation and preferred to receive information through lectures. Some adapters found students unable to cope with the quantity of homework and the pace and scope of activities.

Despite the large differences in the pace and degree of adaptation and in faculty and student acceptance of the new teaching and learning style, all six institutions introduced at least some elements of workshop physics. They believe their newly designed courses to be permanent and are convinced that students learn better than with the traditional approach (see evaluation results below). The variety of uses to which these institutions put Workshop Physics principles and the range of both type and extent of adaptation demonstrate the flexibility of this model. Thus the Workshop Physics project, now in its 14th year, continues to change the way physics is taught across the country.

The Workshop Physics program maintains an automated Internet mailing list or listserv that currently has 70 subscribers, a useful addition to person-to-person mentoring.

Assessment

The University of Maryland's Physics Education Research Group conducted an independent evaluation of learning outcomes at the adapting departments. The evaluation explored student gains in understanding of basic concepts characteristically covered in introductory physics courses and student attitudes, beliefs and assumptions about physics. Results for the Workshop Physics institutions were compared with results for institutions using traditional lecture methods and a mixture of lectures and hands-on methods.

The gains in understanding of basic physics concepts were assessed by two instruments that in different ways measure students' belief in the Newtonian laws of motion as opposed to their common sense beliefs. The two instruments, administered at the beginning and at the end of the course, were used at separate sets of institutions. Both showed students in Workshop Physics courses making twice or more the gains in understanding of students taught by lecture methods and 18 percent greater gains than those taught by mixed methods.

The Maryland Physics Expectation Survey, also administered before and after the course, measures the difference between students' expectations of and their actual experience in the course. It examines student beliefs about what it means to learn physics, how physics knowledge is structured, the nature of physics knowledge, beliefs about the connection between physics and reality, the role of mathematics in physics, and the effort necessary to do well.

All courses showed poorer posttest results on the effort cluster of questions, possibly because students may not have put in as much effort as they expected to at the beginning. For the other five clusters of questions, the traditional and mixed sequences all showed deterioration of the pre-course results for at least one of the clusters, and four of the six traditional courses showed deterioration for at least three clusters. On the other hand, only one of the Workshop Physics courses showed deterioration on any of the five clusters. For three of the five clusters, all the workshop courses showed better outcomes than any of the lecture and mixed-method courses.

The evaluators also conducted interviews with 16 individual students at two of the adapting institutions in order to get more detail about the thinking that underlay responses to the expectations instrument. They found that students clearly saw connections between classroom learning and phenomena they encountered outside the classroom, and that most were convinced that they really could learn physics. Though most felt that they needed to understand the concepts in order to learn, about a third still felt that they could pass the course by memorizing equations and plugging them into problems. Nevertheless, most of the students would rather have been in lecture courses where they were told the concepts rather than having to figure them out for themselves. Much of this preference stemmed from their uncertainty that what they were learning on their own was "right."

The students also had a mixed, but largely favorable, reaction to working in groups. Although personal relationships were occasionally a problem, more often difficulties arose between academically weaker students, who were interested in getting through the work as quickly as possible, and their stronger peers, who wanted to make sure they understood the concepts before moving on.

Further Dissemination

Workshop Physics has been one of the most extensively disseminated innovations in higher education. A series of grants from FIPSE, the National Science Foundation and other sources have supported many well-attended workshops and conference presentations. This project, however, is the first in which the developers of the program have been able to work with institutions over an extended period of time. Conference presentations continue, as does dissemination through a Workshop Physics Web site.

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UNIVERSITY OF MISSOURI SCHOOL OF LAW
Integrating Dispute Resolution into Law School Courses

PRINCIPAL MENTOR: Leonard L. Riskin, School of Law

ADAPTERS: DePaul University, Hamline University, Inter American University of Puerto Rico, Ohio State University, Tulane University, University of Washington

The Innovation

Traditional litigation, though sometimes the best way to settle differences, has given rise to a tide of dissatisfaction. Complaints include high cost, delay, emotional trauma for the parties, and inadequate remedies. Each of these deficiencies stems in part from the tendency of law school education to focus on litigation and the adversarial view of human relations on which it is based. In response to the problems surrounding traditional litigation, an array of programs has been developed to foster alternative methods of dispute resolution, commonly called ADR, for alternative dispute resolution. ADR includes such processes as negotiation, mediation, and arbitration or combinations thereof.

Beginning in 1985, the University of Missouri, Columbia, School of Law systematically integrated alternative dispute resolution, taught through simulations, into all standard first year law school courses. That project produced law school course books, an instructor's manual, and a series of videotapes of simulated situations. Through this dissemination project the university's Center for the Study of Dispute Resolution supported six institutions in creating and strengthening ADR instruction for law school students.

Outcomes

All six adapting institutions introduced or expanded instruction in alternative dispute resolution in ways that appear to be permanent and promise further expansion. Between one and seven courses, many of them first-year, were substantially altered to incorporate material on ADR. All schools added specialized dispute resolution courses at the upper level in the form of either classroom or clinical course offerings.

The disseminators' initial expectations that the adapters would follow their lead in integrating ADR teaching into first-year law courses early proved impossible to achieve. The project director posits the need for four conditions in order for this full-scale integration to take place: 1) at least one knowledgeable and committed lead faculty member who has time to work with colleagues; 2) a core of at least three other like-minded faculty members; 3) strong and visible support from the law school dean; 4) a consensus of the majority of the faculty, even if weak, that ADR should have a place in the first-year curriculum. The first condition held at all six institutions and the third at the four institutions that were not in the process of searching for a dean. The second and fourth conditions prevailed only at those two schools, Hamline and Ohio State, that had worked with ADR for several years in clinical settings and in specialized advanced courses.

The other four institutions chose to involve only those faculty members who were interested, and to place the ADR activities where such interest created opportunity. All made some attempt to include ADR in first-year courses, with outcomes ranging from substantial attention in one or more key courses to ADR simulations in large enrollment courses. The first-year legal writing course, particularly because it is taught in small sections, seemed to be especially hospitable to ADR materials and exercises, but ADR got attention in a wide range of courses taught by interested faculty.

Resistance to ADR had many sources. Some faculty simply did not believe in it or thought that it did not have a theoretical base. This was an attitude of which many were disabused through workshops and clinics conducted in the course of this project. Others worried about losing coverage of other material if ADR activities were introduced. Discomfort with the simulation process, especially the loss of classroom control, was a prevalent source of resistance. Still others saw difficulty in introducing hands-on activities into large courses.

Project leaders at the adapting campuses dealt with these problems in ways ranging from personal persuasion to workshops to semester-long training sessions enrolling both faculty and advanced students. Others made limited efforts at conversion and worked around the resisters, and one largely proceeded on his own.

At the end of the project's two years, two institutions (Inter American University and DePaul) had established negotiation and mediation institutes, in addition to Hamline, which already had one. Still another university was seeking funding for such an institute. Ohio State's College of Law had been given funds to add two new faculty positions in dispute resolution, in light of a general faculty decision to make dispute resolution a major part of the instructional program. The University of Washington and DePaul had created curriculum tracks in dispute resolution.

This project gave rise to a substantial amount of material for publication. Much of it is in the form of exercises and teaching materials that appear in *Instructor's Manual to Accompany Dispute Resolution and Lawyers*, by Leonard Riskin, James Westbrook and James Levin, 2nd ed. (West Publishing Co., 1998).

Particularly useful were two guides to briefing cases in a way that identifies the underlying interests of the parties to the dispute, rather than simply the applicable points of law. These guides were produced independently by two faculty members at two of the adapting institutions as a result of discussions at the second of the project's group conferences.

The principal mentor was unusually effective in offering workshops and demonstration classes which, among other things, served to persuade some faculty that ADR does indeed rest on a strong theoretical base. Particularly energizing for many adapting team members was the prospect of publishing teaching materials and simulation exercises through the mentor institution's contracted books.

This project has been recognized through an award to the principal mentor and the University of Missouri-Columbia School of Law from the CPR Institute for Dispute Resolution, a coalition of leading corporations and law firms with offices in New York City. The award was for "Pioneering Work Introducing ADR into the Curriculum at the University of Missouri-Columbia School of Law and Assisting Other Law Schools in Developing Similar Programs."

Assessment

Hamline undertook an evaluation to see how students' attitudes toward ADR had changed as a result of instruction in the first-year course. Overall, they found an increase in students' orientation to ADR, largely as a result of the changed attitudes of women students. Women began the course with a more negative attitude toward ADR than men but moved strongly toward ADR by the end of the course. Men, on the other hand, actually moved slightly in the direction of adversarial proceedings.

Overall project evaluation was performed by an external evaluator who had served in that role for the University of Missouri's two earlier FIPSE-funded projects. Because the adapters were at such different stages of introducing ADR and took such different approaches to their work, no common statistical evaluation was possible. Thus the evaluation consists of a thoughtful essay on the nature of the innovation and its possibilities for dissemination.

The evaluator notes that ADR appears to most faculty as heretical, challenging prevailing legal practice and, in its emphasis on active simulation, the prevailing pedagogy of law schools. For dissemination to be successful, these heresies must in some way be "tamed," presented in such a way that they are at least tolerable to a majority of the faculty.

The taming procedure inevitably results in a number of substantial changes, such as putting the pure dispute resolution strategies into a context of pre-trial negotiations in which the resolution occurs under the threat of eventual litigation. Although this solution is comforting to traditional faculty, it misses the point of ADR.

Compromises of preferred instructional procedures may also be necessary. If ADR is integrated across many courses, it must depend in part on marginally sympathetic faculty who do not understand how the simulations work and are not entirely comfortable with them. In both substantive and procedural cases, the danger lies in compromising basic intentions beyond recognition. Apparently this has not happened at either the mentor or the adapting institutions, probably because implementation was conducted slowly and carefully and left in the hands of committed faculty until others could be trained.

In view of the nature of the innovation and the difficulties of disseminating it is remarkable that the adapters succeeded in establishing a firm presence for a radically different approach to the training of lawyers.

Further Dissemination

The original University of Missouri project produced a steady stream of publications. The major products of the dissemination project itself are the teaching materials and simulations included in the instructor's manual for the second edition of *Dispute Resolution and Lawyers*, mentioned above. A 1998 symposium issue of the *Florida Law Review* focused on the dissemination project and included articles by the principal mentor, the evaluator, and five professors from adapting institutions.

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MORAVIAN COLLEGE CLUSTER

Integration of Precalculus Topics into the First Course in Calculus

PRINCIPAL MENTOR: Doris Schattschneider, Mathematics Department

ADAPTERS: DePauw University, The George Washington University, Hudson Valley Community College, University of Puerto Rico-Mayagüez, University of Puerto Rico-Río Piedras, United States Military Academy

The Innovation

Students who come to college unprepared to enroll in a required calculus course characteristically take precalculus first. There they study a number of topics they will need in calculus, but often they study them with no sense of the relationship of those topics to their later study in mathematics. By the time the students need to apply their prior learning in the calculus sequence, they have often forgotten what they learned earlier.

To address this problem, Moravian College developed a two-course sequence, "Calculus I with Review," integrating precalculus and the first semester of calculus. Precalculus topics are introduced at the time they are needed to understand the calculus concepts. This "just in time" approach is supported by a published text, *A Companion to Calculus*, developed by members of the Moravian College faculty. Adapters used this text along with their regular calculus in their newly established integrated sequence.

Outcomes

At four of the six adapting institutions the new integrated course is fully institutionalized. Its status is somewhat uncertain at the two University of Puerto Rico campuses, where the mathematics department has somewhat less control over course placement and course approval processes are more cumbersome.

This innovation apparently responds to widespread frustrations of mathematics faculty about the precalculus-calculus sequence. Though each campus experienced resistance to the new course from some faculty members, the superior effects on student persistence in the integrated sequence were hard to argue with. And where students had a choice of pursuing an integrated sequence rather than the traditional sequence they overwhelmingly chose the former. In view of the evidence, dubious faculty had little choice but to accede to departmental decisions to adopt the integrated sequence exclusively.

Of all the innovations disseminated through the "Disseminating Proven Reforms" competition, this one seems the most readily and broadly transferable. It deals with courses that virtually all institutions offer on a large scale and addresses a widely felt need. It is accompanied by strong, straightforward assessment questions and methods that seem always to show better student retention for the integrated course than for traditional courses. Finally, although it requires faculty to change the logic and organization of their courses, it does not require them to change their teaching styles.

Assessment

The adapters used the same assessment strategy that the mentors had when they instituted the original program. They looked at: student persistence rates from the first semester of the sequence to the second, and rates of completion for the second course; the performance of integrated-course students compared to students in the traditional sequence on a set of problems included in the final examinations of both courses; instructor attitudes, including comparative assessment of the integrated and traditional sequences; and student attitudes.

Uniformly, student persistence through the sequence was higher for the integrated course than for calculus preceded by precalculus. Integrated-sequence students performed at least as well on a set of common problems as the traditional-course students, and sometimes better. In general, both faculty and students liked the integrated sequence better.

Further Dissemination

Moravian faculty continue to get inquiries about their course and to be invited to make presentations. During the time of the project they and the adapters made eight conference presentations. As a result of the work at Hudson Valley Community College, the Moravian group has been invited to work with faculty at the State University of New York, Albany, which is the main transfer institution for Hudson Valley students. The project Web site is located at the community college.

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STANFORD UNIVERSITY
Building an Extended Community of Service Learners

PRINCIPAL MENTOR: Timothy Stanton, Haas Center for Public Service

ADAPTERS: California State University-Monterey Bay, Mills College, Portland State University

The Innovation

Since the founding of Campus Compact more than 15 years ago, service learning has become a familiar feature of undergraduate education. Stanford, whose former president Donald Kennedy was one of Campus Compact's three founders, has been a leader in this work, with many of the university's programs emanating from the endowed Haas Center for Public Service.

Service learning is distinguished from other types of experiential learning by its special concern that students develop habits of community service as part of their undergraduate education. Unlike internships or cooperative education, service learning does not seek to contribute to students' career development (although it may) but rather to draw students' attention to the nature and obligations of living in a democratic society made up of many different kinds of people. Service learning proceeds from volunteerism but puts that impulse within specific intellectual, often academic contexts.

While student affairs offices have been the locus of volunteer activities and are the organizers of much service learning activity, academic, credit-granting programs have increasingly adopted service learning as a required aspect of courses or as the focus of whole field-based learning experiences. Stanford has been successful in finding ways to incorporate service learning into the intellectual traditions of the university in a wide range of departments, including opportunities to use service learning experiences as the basis for student research.

Outcomes

Service learning differs from other innovations in "Disseminating Proven Reforms" in that it is not a defined and specific program. Rather, it encompasses a wide range of activities and takes many forms, depending on institutional context. Unlike, say, Supplemental Instruction (Anne Arundel) or Workshop Physics (Dickinson), service learning is not a single structure and set of procedures but rather a commitment to particular principles and emphases in undergraduate education, accompanied by a range of pedagogies that are still developing and expanding. Therefore, the participants in this cluster did not expect to take specific activities that are successful at Stanford and adapt them but rather to use Stanford's longer experience and pedagogical principles to guide their diverse programs. The group adopted a "co-mentoring" model of dissemination whereby each of the participants brought its particular experiences to the table for the benefit of the others.

Rather than Stanford mentors hosting conferences and visiting each of the adapters in turn, the group met quarterly during the two years of the project, rotating the meetings among the partner campuses. The host campus was responsible for organizing a two-day program on a mutually agreed theme that evolved into a "curriculum" for the participants. Topics for the meetings included assessment, embedding service learning in the curriculum, community partnerships, faculty scholarship, and institutional culture.

At project's end, the four campuses that made up this cluster were in quite different situations with regard to service learning. Stanford, with the most mature program, continued efforts to develop new programs and to extend existing ones into new departments, thus increasing both faculty and student participation. California State University, Monterey Bay, created two years earlier with service learning as a defining feature of its mission, was in the process of determining just how that mission would translate into curriculum and pedagogy. Mills College, a small liberal arts institution, was just beginning a serious effort at service learning. During the project period, loss of internal funding for service learning and instability in program leadership substantially retarded efforts. A recent large grant to expand the multicultural aspects of the curriculum includes creation of 40 new service learning courses.

Portland State recently reorganized itself and its curriculum to focus on its relationship to its urban community. Service learning is a requirement for sophomores and, as a general education capstone experience, for seniors as well.

In summary, the two independent institutions are seeking to expand their activities within an established structure, one with stable leadership and substantial funding, the other with fluctuating funding and changing program administration. The two public institutions, one newly created and the other significantly transformed, have made service learning a defining focus.

The participants felt that individually and collectively they had made progress in the following areas: deepening practice and developing the field, creating a professional community, further validating and legitimizing service learning on campus, encouraging and strengthening continuous assessment of service learning, developing a renewed focus on and an understanding of students engaged in service learning, recognizing the importance of institutional context in the process of institutionalizing service learning, and developing new strategies for research and assessment.

It is difficult to cite concrete examples of these accomplishments, although many of them were visible in the context of the rich conversations at the quarterly meetings. For the most part, the outcomes are expanded knowledge and awareness resulting in improved program content and process at the member institutions. The group members, all leading administrators of service learning programs at their institutions, provided samples of the direct experience of service learning participants and some unusually sophisticated reflections on the programs. This is a model of mutual mentoring through intense, structured conversation carried on for an extended period of time.

Assessment

Each of the institutions assessed their progress in terms of a set of "indicators" developed throughout the project. Some of these indicators, such as assessment efforts, program sustainability, and embedded service learning, were used by all the campuses. Some individual participants added their own, such as formation of community partnerships and faculty scholarship. In the final report, each campus listed specific examples of progress for each of the indicators. The structure of the partnership as a whole and specific areas of progress were examined, described and commented on by an external evaluator, who attempted to estimate the project's effects on the partners. The evaluation emphasized strategies and improved practice as opposed to numbers of new courses, because three of the four institutions already were carrying out large service learning programs

The participants also developed a joint research project in each institution and interviewed students who had participated in various kinds of service learning activity. From these interviews they are developing portraits of typical students to serve as benchmarks in assessing the effects of their programs.

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